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PATENT  
Attorney Docket: 1094-12

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPELLANT(S): Karrs et al.

GROUP: 1764

SERIAL NO.: 09/973,401

EXAMINER: Thanh P. Duong

FILED: October 9, 2001

FOR: MODULAR SYSTEM AND METHOD FOR THE  
CATALYTIC TREATMENT OF A GAS STREAM

Dated: April 2, 2007

Mail Stop: Appeal Brief-Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

TRANSMITTAL OF APPELLANTS' BRIEF

Sir:

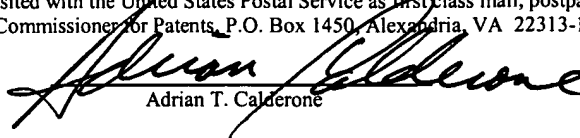
This Brief is being submitted in triplicate pursuant to 37 C.F.R. § 1.192. A Request for Reinstatement of the Notice of Appeal was mailed on February 1, 2007.

An Appellants' Brief was initially filed January 23, 2006. However, prosecution was reopened. It is respectfully requested that the prior paid Notice of Appeal fee and appeal brief fee be applied herein.

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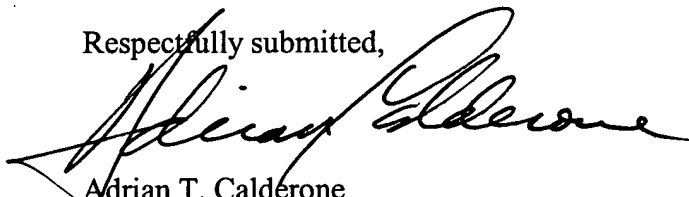
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Dated: April 2, 2007

  
Adrian T. Calderone

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Respectfully submitted,

A handwritten signature in black ink, appearing to read "Adrian T. Calderone", written over a horizontal line.

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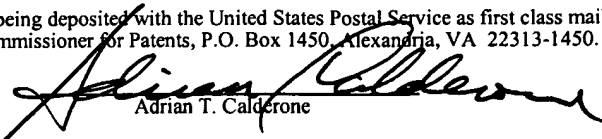
This appeal is taken in view of the final rejection of the claims in the final Office Action  
dated November 1, 2006.

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Adrian T. Calderone

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**I. REAL PARTY IN INTEREST**

This application is assigned to ABB Lummus Global Inc.

## **II. RELATED APPEALS AND INTERFERENCES**

Applicants are aware of no outstanding related Appeals or Interferences related to the present application.

### **III. STATUS OF CLAIMS**

The Examiner has issued a final rejection of pending claims 1-38 and 50-57. Applicants have cancelled claims 39-49. The claims to be examined on this Appeal are claims 1-38 and 50-57.



#### **IV. STATUS OF AMENDMENTS**

No amendments were filed by Appellants after the final Office Action.

## **V. SUMMARY OF CLAIMED SUBJECT MATTER**

The present invention relates to a system for catalytically treating a gas stream, and particularly to a system for catalytically reducing the content of undesirable compounds such as nitrogen and/or sulfur oxides in a flue gas resulting from the combustion of fuel. A summary of the individual claims is set forth below in Table 1. See specification page 1, lines 1-7, and Fig. 1 of the drawings.

Table 1

<b>Claims</b>	<b>Support</b>
1. A system for catalytically treating a gas stream, which comprises: a) a gas phase reactor containing a catalyst for the treatment of the gas stream in at least one catalyst bed having an upstream end and a downstream end;	See, for example, Fig. 1 of the drawings and page 13, line 10 <i>et seq.</i> of the specification, and description of reactor system 400, and catalyst beds 410 and 420 at pages 17-18.
b) an axial fan positioned upstream of the at least one catalyst bed and having a rotatable impeller for moving the gas stream through the gas phase reactor; and,	See, fan system 100, impeller assembly 130, Figs. 2 and 3 of the drawings, and page 8, line 1 to page 10, line 10 of the specification.
c) gas flow modification means positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity.	See generally, page 12, line 6 to page 14, line 24, and Figs 1 and 2 of the drawings. Particularly, note gas flow modification means can include tapered tail cone 140, guide vanes 310, and transition duct 310 with perforated walls 321.
2. The system of claim 1 wherein the gas flow uniformity is increased by the gas flow modification means such that the gas stream entering the gas phase reactor has a velocity profile exhibiting not more than about 10% velocity deviation from an average gas stream velocity at the upstream end of the at least one catalyst bed.	See page 11, lines 18 to 24.
3. The system of claim 2 wherein the velocity profile of the gas stream exhibits no more than about a 5% velocity deviation from an average gas stream velocity at the upstream end of the at least one catalyst bed.	See page 11, lines 18 to 24.

4. The system of claim 1 wherein the axial fan includes a housing and a tail cone, and the gas flow modification means includes a distally pointing tapered end portion of the tail cone and a flared portion of the housing having a gradually increasing diameter.	See, Figs. 1 and 2 and specification page 12, lines 6-20.
5. The system of claim 4 wherein the gas flow modification means further includes a transition duct having perforated walls which flare outward so as to gradually increase cross-sectional area available to gas stream flow.	Fig. 1 and specification page 14, lines 5-13.
6. The system of claim 1 wherein the gas flow modification means includes a transition duct having perforated walls which flare outward so as to gradually increase cross-sectional area available to gas stream flow.	Fig. 1 and specification page 14, lines 5-13.
7. The system of claim 1 further including means for recycling a portion of the gas stream from downstream of the axial fan to a position upstream of the axial fan.	Fig. 1 and specification page 15, lines 1-20.
8. The system of claim 1 wherein the gas stream contains nitrogen oxide.	Specification, page 5, lines 15-18.
9. The system of claim 1 wherein the catalyst bed includes a plurality of stackable, individually separable modules containing one or more materials selected from the group consisting of vanadium oxide, aluminum oxide, titanium oxide, tungsten oxide, molybdenum oxide and zeolite.	Figs. 1, 5 and 6 and specification page 15, line 21 to page 18, line 21.
10. The system of claim 9 wherein the modules each comprise a plurality of stacked catalyst elements having a honeycomb type structure.	Fig. 5, specification page 16, line 17 to page 17, line 65.
11. The system of claim 1 wherein the catalyst bed comprises a catalyst supported on a mesh-like structure having a void space of at least about 85%.	Specification, page 17, lines 6-21.
12. The system of claim 1 wherein the catalyst bed includes a vanadium pentoxide catalyst on titanium oxide support.	Specification page 17, lines 12-13.
13. The system of claim 1 wherein the gas phase reactor comprises at least two catalyst beds arranged in series.	Specification page 20, line 20.

14. The system of claim 1 wherein the fan impeller includes a plurality of blade units attached to and extending radially outward from a circumferential periphery of the impeller.	Fig. 3 and specification page 8, line 22 to page 9, line 14.
15. The system of claim 14 wherein the blade units each comprise two blades.	See, page 9, lines 5-14 of the specification and Fig. 4 of the drawings
16. The system of claim 14 wherein the blade units have a variable pitch which is controllable while the impeller is rotating.	Specification page 9, lines 17-23.
17. The system of claim 14 wherein the impeller has a variable speed of rotation which is adjustable while the impeller is rotating.	Specification, page 10, lines 1-3.
18. The system of claim 1 further including a heat recovery section positioned downstream of the gas phase reactor for cooling the gas stream.	Specification, page 19, lines 4-17, and Fig. 1.
19. The system of claim 1 further including means for introducing reducing agent into the gas stream.	Fig. 1 and specification page 15, lines 1-6.
20. The system of claim 19 further including a gas stream recycle manifold for communicating a portion of the gas stream downstream of the axial fan to a convection section of a furnace positioned upstream of the axial fan, wherein the means for introducing reducing agent comprises an inlet for introducing the reducing agent into the gas stream recycle manifold.	Fig. 1 and specification page 15, lines 1-20.
21. A system for catalytically treating a furnace flue gas, which comprises: a) a gas phase reactor containing a catalyst for the treatment of the flue gas in at least one catalyst bed having an upstream end and a downstream end;	See, Fig. 1 of the drawings and page 13, line 10, <i>et seq.</i> of the specification, and description of the reactor system 400 and catalyst beds 410 and 420 at pages 17-18
b) an axial fan positioned upstream of the at least one catalyst bed and downstream of a furnace and having a rotatable impeller for moving the flue gas from the furnace through the gas phase reactor; and,	See, fan system 100, impeller assembly 130, Figs. 2 and 3 of the drawings, and page 8, lines 1 to page 10, line 10 of the specification
c) means for recycling a portion of the flue gas from downstream of the axial fan to a convection section of the furnace located upstream of the axial fan.	See Fig. 1 of the drawings and page 15, lines 1-20

22. The system of claim 21 wherein the means for recycling a portion of the flue gas comprises a gas stream recycle manifold.	Specification page 15, lines 1-20 and Fig. 1
23. The system of claim 22 wherein the gas stream recycle manifold includes an inlet for introducing reducing agent into recycle manifold.	Fig. 1 and specification page 15, lines 1-6.
24. The system of claim 22 wherein the gas stream recycle manifold includes a control valve.	Fig. 1 and specification page 15, lines 11-13.
25. The system of claim 22 further comprising a transition duct having perforated walls which flare outward so as to gradually increase cross-sectional area available to flue gas flow.	Fig. 1 and specification page 14, lines 5-13.
26. The system of claim 25 wherein the gas stream recycle manifold has at least one inlet connected to the transition duct, and at least one outlet connected to the convection section of the furnace.	Fig. 1 and specification page 15, lines 1-20.
27. The system of claim 21 wherein the axial fan includes a housing and a tail cone, the housing having a flared distal portion and the tail cone having a distally pointing tapered end portion.	Fig. 2 and specification page 12, lines 6-20.
28. The system of claim 21 wherein the catalyst bed includes a plurality of stackable, individually separable modules containing one or more materials selected from the group consisting of vanadium oxide, aluminum oxide, titanium oxide, tungsten oxide, molybdenum oxide and zeolite.	Figs. 1 and 6, and specification page 16, lines 6-16, and page 18, lines 1-13.
29. The system of claim 28 wherein the modules each comprise a plurality of stacked catalyst elements having a honeycomb type structure.	Fig. 5 and specification page 16, lines 19-23.
30. The system of claim 21 wherein the catalyst bed comprises a catalyst supported on a mesh-like structure having a void space of at least about 85%.	Specification page 17, lines 6-21.
31. The system of claim 21 wherein the flue gas contains nitrogen oxide.	Specification, page 5, lines 17-19, page 6, <i>et seq.</i>
32. The system of claim 31 wherein the at least one catalyst bed includes a vanadium pentoxide catalyst on titanium oxide support.	Specification page 11, lines 12-13.

33. The system of claim 21 wherein the gas phase reactor comprises at least two catalyst beds arranged in series.	Specification, page 20, line 20.
34. The system of claim 21 wherein the fan impeller includes a plurality of blade units attached to and extending radially outward from a circumferential periphery of the impeller.	Fig. 3, and specification page 8, line 22 to page 9, line 14.
35. The system of claim 34 wherein the blade units each comprise two blades.	Page 9, lines 5-14 of the specification and Fig. 4 of the drawings.
36. The system of claim 34 wherein the blade units have a variable pitch which is controllable while the impeller is rotating.	Specification, page 9, lines 17-23.
37. The system of claim 34 wherein the impeller has a variable speed of rotation which is adjustable while the impeller is rotating.	Specification page 10, lines 1-3.
38. The system of claim 21 further including a heat recovery section positioned downstream of the gas phase reactor for cooling the flue gas.	Specification page 19, lines 4-17, and Fig. 1.
50. The system of claim 1, wherein the gas flow modification means comprises: a housing including a tail cone, wherein the housing surrounds the axial fan, and wherein the tail cone is positioned downstream from the axial fan; and,	See Figs. 1 and 2 and specification page 12, lines 6-20.
a transitional duct having perforated walls that are flared outward disposed downstream from the housing.	Specification page 14, lines 5-13 and Fig. 1.
51. The system of claim 50, wherein the tail cone has a substantially conical shape and comprises a distally pointing tapered end portion.	Fig. 2, specification page 12, lines 9-13.
52. The system of claim 51, wherein the tail cone is supported within the housing by longitudinally oriented planar struts positioned in an annular space between the tail cone and an interior surface of the housing, wherein the struts act as baffles to reduce swirl and direct gas flow towards an axial flow of the flue gas through the system.	Fig. 2, specification page 12, lines 13-20.

<p>53. The system of claim 50, wherein the housing further comprises:  an outlet, wherein a diameter of the outlet is greater than a diameter of an impeller of the axial fan, and wherein the circumference of the housing gradually increases from a position of the housing at the axial fan to the outlet of the housing.</p>	<p>Specification page 12, line 21 to page 13, line 9.</p>
<p>54. The system of claim 50, wherein the gas flow modification means further comprises a guide vane unit disposed at an inlet of the transition duct, wherein the guide vane unit includes louvers for redirecting the flow of the flue gas.</p>	<p>Fig. 1 and specification page 13, lines 17-23.</p>
<p>55. The system of claim 4, wherein the gas flow modification means further comprises: a transition duct having perforated walls that flare outward positioned downstream from the housing; and,</p>	<p>Fig. 1 and specification page 14, lines 1-10.</p>
<p>a guide vane unit disposed at an inlet of the transition duct, wherein the guide vane unit includes louvers for redirecting the flow of the flue gas.</p>	<p>Fig. 1 and specification page 13, lines 17-23.</p>
<p>56. The system of claim 6, wherein the gas flow modification means further comprises: a transition duct having perforated walls that flare outward positioned downstream from the housing; and,</p>	<p>Fig. 1 and specification page 14, lines 5-13.</p>
<p>a guide vane unit disposed at an inlet of the transition duct, wherein the guide vane unit includes louvers for redirecting the flow of the flue gas.</p>	<p>Fig. 1 and specification page 13, lines 17-23.</p>
<p>57. The system of claim 27, wherein the gas flow modification means further comprises: a transition duct having perforated walls that flare outward positioned downstream from the housing; and,</p>	<p>Fig. 1 and specification page 14, lines 5-13.</p>
<p>a guide vane unit disposed at an inlet of the transition duct, wherein the guide vane unit includes louvers for redirecting the flow of the flue gas.</p>	<p>Fig. 1 and specification page 13, lines 17-23.</p>

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

The following references are cited in support of the rejections of the claims as listed below.

European Patent Application 0166480 (hereinafter, "EU '480")

U.S. Patent No. 5,282,355 (hereinafter, "Yamaguchi")

U.S. Patent No. 5,632,142 (hereinafter, "Surette")

U.S. Patent No. 2,936,846 (hereinafter "Tyler")

U.S. Patent No. 5,043,146 (hereinafter, "Ishikawa")

U.S. Patent No. 5,397,545 (hereinafter, "Balling")

U.S. Patent No. 6,534,022 (hereinafter, "Carlborg")

U.S. Patent No. 5,709,088 (hereinafter, "Acaster")

U.S. Patent No. 5,476,378 (hereinafter, "Zagoroff")

An "admission" in Appellants' specification at page 9, lines 15-23 (hereinafter, "Admission").

The issues raised by the rejections are as follows:

1. Whether Claims 1-3, 8, 14 and 15 are anticipated under 35 U.S.C. § 102(b) by EU '480.
2. Whether Claims 1 and 21-23, 31, 34-35 and 38 are anticipated under 35 U.S.C. § 103(a) by Yamaguchi.
3. Whether Claims 2-3 are obvious under 35 U.S.C. §103(a) over EU '480.
4. Whether Claim 4 is obvious under 35 U.S.C. §103(a) over EU '480 in view of Surette.
5. Whether Claims 5, 50, 51 and 53-55 are obvious under 35 U.S.C. §103(a) over EU '480 in view of Surette and further in view of Tyler and Ishikawa.
6. Whether Claims 6 and 56 are obvious under 35 U.S.C. §103(a) over EU '480 in view



of Tyler and Ishikawa.

7. Whether Claims 7 and 18-20 are obvious under 35 U.S.C. §103(a) over EU '480 in view of Yamaguchi.

8. Whether Claims 9-10 and 12-13 are obvious under 35 U.S.C. §103(a) over EU '480 in view of Balling.

9. Whether Claim 11 is obvious under 35 U.S.C. §103(a) over EU '480 in view of Carlborg.

10. Whether Claim 16 is obvious under 35 U.S.C. §103(a) over EU '480 in view of an "Admission" in applicants' specification at page 9, lines 15-23.

11. Whether Claim 17 is obvious under 35 U.S.C. §103(a) over EU '480 in view of Acaster.

12. Whether Claims 21-24 are obvious under 35 U.S.C. §103(a) over EU '480 in view of Yamaguchi.

13. Whether Claims 25 and 26 are obvious under 35 U.S.C. §103(a) over EU '480 in view of Yamaguchi and further in view of Tyler and Ishikawa.

14. Whether Claims 25 and 26 are obvious under 35 U.S.C. §103(a) over Yamaguchi in view of Tyler and Ishikawa.

15. Whether Claim 27 is obvious under 35 U.S.C. §103(a) over Yamaguchi in view of Surette.

16. Whether Claim 30 is obvious under 35 U.S.C. §103(a) over Yamaguchi in view of Carlborg.

17. Whether Claims 28-29 and 32-33 are rejected under 35 U.S.C. §103(a) as being obvious over Yamaguchi in view of Balling.

18. Whether Claim 36 is obvious under 35 U.S.C. §103(a) over Yamaguchi in view of

Admission.

19. Whether Claim 37 is obvious under 35 U.S.C. §103(a) over Yamaguchi in view of

Acaster.

20. Whether Claim 52 is obvious under 35 U.S.C. §103(a) over EU '480 in view of

Surette and Tyler and Ishikawa, and further in view of Zagoroff.

21. Whether Claim 57 is obvious under 35 U.S.C. §103(a) over EU 480 in view of

Surette and further in view of Tyler and Ishikawa.

## VII. ARGUMENT

Applicants are forced to file their second appeal brief for this application. Rather than rely on the objective evidence in record, as mandated by the MPEP and relevant legal precedent, the Examiner in the present application has repeatedly made conclusory and completely unsupported rejections based upon gross mischaracterizations of the prior art. More specifically, in the multitude of rejections under 35 U.S.C. § 103(a) to which Appellants have been forced to respond below, the Appellants note that the Examiner has continually made unsupported assertions and subjectively flawed statements in characterizing what the prior art references disclose. Rejections must be based upon the objective evidence of record. *In re Lee*, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002). Particular findings must be made as to the reason the skilled artisan, *with no knowledge of the claimed invention*, would have selected the components for combination in the manner claimed. See, *In re Kotzab*, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). The factual question of motivation is material to patentability and cannot be resolved on subjective belief and unknown authority. *In re Lee* at 1434. The Examiner is obliged to develop an evidentiary basis for supporting rejections. Deficiencies in the cited references cannot be remedied by conclusory statements. See, *In re Zurko*, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001).

The current Final Rejection is the fourth rejection of the present application. While this in itself is not improper, the true travesty in the prosecution is the fact that the Examiner has made virtually the same rejection in each and every Office Action, even when the Examiner reopened prosecution in light of the Appellant's previously filed appeal and brief. The rejections presented after reopening the prosecution are virtually identical to the current final Office Action save one minor difference. The present Final Rejection has rejected claims 1, 21-23, 31, 34-35, and 38 under 35 U.S.C. § 103(a) in view of Yamaguchi. The previous Final Rejection had the identical rejection, which was merely erroneously listed as a rejection under 35

U.S.C. § 102(b). The sum total of the Examiner's response to Appellants' initial Appeal Brief was to reopen prosecution and fix his own typographical error in the rejection. The other rejections in both Final Office Actions are very nearly identical (including the typographical errors).

Of more concern to the Appellants is that the Examiner's responses to the Applicant's responses are occasionally unintelligible (see, e.g., Final Office Action dated November 1, 2006, p. 21, apparently describing the location and mechanism of action for recycling flue gas) or so terribly misinterpret the prior art as to have an instrumentality on the outside of a prior art body supposedly affect the flow of the gas within the body (see, e.g., Final Office Action dated November 1, 2006, p. 2, (erroneously describing an exterior housing as an internal gas flow modification means) or simply fabricating elements that did not exist in the prior art (see, e.g., Final Office Action dated November 1, 2006, p. 4, incorrectly identifying a system schematic diagram as containing a conical section). The Examiner's untenable positions, in conjunction with his steadfast refusal to properly examine the present application have compelled the Appellants to file this second appeal of the present application.

#### I. REJECTION UNDER 35 U.S.C. §102(b) OVER EU '480

The Examiner rejected Claims 1-3, 8, 14 and 15 under 35 U.S.C. § 102 (b) as being anticipated by European Patent Application No. 0166480 (hereinafter "EU '480"). More specifically, the Examiner contends that:

EU '480 discloses a system for catalytically treating a gas stream which comprises: a gas phase reactor containing a catalyst (disks 20) for the treatment of the gas stream containing NO<sub>x</sub> (page 2, line 1) in at least one catalyst bed having an upstream end and a downstream end; an axial fan (7) positioned upstream of the at least one catalyst bed and having a rotatable impeller (rotor blades as shown in Figure) for moving the gas stream through the gas phase reactor; and, c) gas flow modification means (the flare portion

34 connected after the constricted area 13 as shown in Figure and See below illustrated dwgs) positioned between the impeller and the gas phase reactor for decreasing stream velocity, and increasing gas flow uniformity. (Final Office Action dated November 1, 2006, p. 2).

It is black letter law that in order to anticipate the claims of an application, a single prior art reference must contain each and every element of the claimed invention. MPEP § 2131; *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). According to the Examiner, the '480 patent contains each and every element of the claims, including, *inter alia*, a gas flow modification system comprised of a flare portion (34) positioned between the impeller and the gas phase reactor (which is the set of disks 20). The Examiner is mistaken. EU '480 fails to disclose at least the features of both elements (b) and (c) of Claim 1.

A. Claims 1, 8 and 14

1. The Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 102(b) because EU '480 fails to disclose gas flow modification means that decreases velocity and improves gas flow uniformity.

Element (c) of Claim 1 requires “gas flow modification means positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity.” In paragraph 1 of the Final Office Action, the Examiner mistakenly identifies the gas flow modification means as “the flare portion 34 connected after the constricted area 13” positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity.

The Examiner completely misses the mark. In contrast to the Examiner's contention that element 34 is a “gas flow modification system,” it is merely an exterior wall that surrounds the *outside of the casing* (30, 31). See Exhibit A, p. 6. According to the specification of 'EU 480, wall member 34 is positioned a certain distance away to guide air to sweep the casing and cool it effectively. *Id.* Accordingly, it merely acts to improve the aerodynamic properties of the *outside*

*of the muffler* so that *outside air* can flow efficiently over it and effectively dissipate heat. It is not an active system that actually modifies the flow of the exhaust gases. Indeed, the '480 application utilizes the term "exhaust gases" to describe the NO<sub>x</sub> containing gases located in the muffler, as opposed to the term "air" which he uses to describe atmosphere outside the system. Clearly the use of different terms denotes different gases. Accordingly, the casing (34) that the Examiner contends "modifies the gas flow" does not actually modify the flow of the exhaust gas at all. Further, because it is located externally to the outside casing, it *cannot* act on the exhaust gases contained therein. That is, the inner chamber of the '480 patent is a partially closed system in that the only access to outside air is through suction through the intake guides.

Furthermore, the only element of EU '480 which could even be considered to be a "gas flow modification means" is the tapered portions of casing 33. More specifically, referring to Fig. 1 of EU '480, (an English translation of which is Attached as Exhibit A) EU '480 discloses a muffler comprising an inlet (1) for exhaust gases with a valve (3, 4). Porous intake guides (2) allow for outside air to enter the central chamber. As exhaust gas is pumped in, it forces a set of impeller blades (7, 11 13) to spin, which creates suction and forces outside air into the chamber through the intake guides. The resulting air/exhaust mixture enters a burner chamber (15) through a plurality of openings (17). Gas is guided into the chamber through tapered portions of the housing (33).

Because these portions narrow the opening into the combustion chamber, one of ordinary skill in the art recognizes that the velocity of any gas propelled therethrough is actually *increased*. Element (c) of Claim 1 of the instant application, however, requires that the gas flow modification means acts to *decrease* the gas velocity.

Accordingly, EU '480 fails to disclose element (c) of Claim 1. As a result, the Examiner's rejection is improper and should be withdrawn.

2. The Examiner's rejection is improper because his analysis is not in conformance with established MPEP guidelines.

Trying to account for this deficiency, the Examiner states "...; therefore the gas flow modification means of EU '480 inherently decreases the gas flow velocity and increases the gas flow uniformity..." (Final Office Action dated November 1, 2006, pg. 3). Though Appellants will rebut the Examiner's incorrect use of inherency in the next section of this Brief, it is important to note here that the Examiner has not correctly performed his analysis (indeed he performed no analysis) as required by the MPEP for a "means-plus-function" element. Element (c) of Claim 1 is in the "means-plus-function" format. The Court of Appeals for the Federal Circuit, in its *en banc* decision *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994), decided that a "means- (or step) plus-function" limitation should be interpreted in accordance with 35 U.S.C. §112, sixth paragraph.<sup>1</sup> That is, when determining the patentability of claims under 35 U.S.C. §102 or §103, the Examiner may not disregard the structure disclosed in the specification corresponding to such language when rendering a patentability determination. *See*, MPEP § 2181.

According to MPEP § 2183, in order to establish an equivalent element in a means-plus-function claim, the Examiner must find that the prior art element:

- (A) performs the function specified in the claim,
- (B) is not excluded by any explicit definition provided in the specification for an equivalent, and
- (C) is an equivalent of the means-(or step-) plus function limitation.

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<sup>1</sup> 35 U.S.C. §112, sixth paragraph states:

An element in a claim for combination may be expressed as a means or step for performing a specified function without the recital of structure, materials, or acts in support thereof, and such claims shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Further, the MPEP requires that the Examiner provide an explanation and rationale in the Office Action as to why the prior art element is equivalent. MPEP § 2183.

As shown by the quotation of the Examiner's rejection above, the Examiner has not performed the requisite analysis, nor has he provided a rationale as required. Further, even if the Examiner had attempted the required analysis, the Examiner would not be able to establish element (a) of MPEP § 2183 because EU '480 does not disclose or suggest anything equivalent to the gas flow modification means claimed and described by Appellants.

EU '480 does not perform the function specified by element (c) of Claim 1. Referring now to Appellants' specification, pages 12-14, the gas flow modification means includes a generally cylindrical longitudinally extending tail cone 140 having a distally pointing tapered end portion 141 with a generally conical shape. (Specification, page 12, lines 9-13, Fig. 2). Moreover, the housing has a distal end section 111 which flares outward in diameter such that the exit diameter of the housing is greater than the diameter at the impeller. The combined reduction of the diameter of the tail cone at tapered end 141 and increasing diameter of the housing at flared section 111 forms an annular diffuser which increases the cross sectional area available for gas flow. This reduces the velocity of the gas and tends to flatten the velocity profile of the gas. (Specification, page 12, line 21 to page 13, line 9).

Additional gas flow modification features of the invention include a guide vane unit 310 and transition duct 320, which includes outwardly flared perforated walls 321. The perforations serve to prevent flow separation and improve flow uniformity. Specification, page 13 lines 10 to page 14, line 13. As noted at page 14, lines 19-23, the gas flow modification is achieved by expanding the cross-sectional area available to gas flow and the use of guide vanes, baffles and other such surfaces for orienting the flow direction of gas.



In stark contrast, the EU '480 exhaust gas silencer does not perform the same function as the gas flow modification means of Claim 1 (i.e., it does not decrease gas stream velocity and increase gas flow uniformity), nor does the EU '480 system perform in the same way and achieve the same result as Appellants' gas flow modification means. To the contrary, the EU '480 device includes a convergent section which increases gas flow velocity. Further, there is an afterburner 15 positioned in the path of the gas stream which disrupts the gas flow uniformity, not increases it. Moreover, the cross-sectional area available to gas flow at the catalyst elements 20, 21 is no greater than the cross-sectional area available for gas flow at the impeller 7. Nowhere in EU '480 is it disclosed that the gas flow velocity actually decreases. Nowhere in EU '480 is it disclosed that gas flow uniformity is increased. Nor is there any feature of the EU '480 device which would lead one skilled in the art to draw either such conclusion.

As a secondary analysis that EU '480 does not decrease gas flow velocity and increase gas flow uniformity, the specification of EU '480 discloses that there is a stratification of gases inside the muffler chamber. See EU '480, pg. 6, paragraph 9. That is, the gas mixture is separated by the weight of its component gases, forming a plurality of heterogeneous layers. As a result, the lighter portion of the heterogeneous gas mixture travels at a faster speed than the heavier portion of the gas mixture. Therefore, EU '480 does not achieve gas flow uniformity as does Appellants' claimed device.

Accordingly, one skilled in the art would not find any equivalent to Appellants' gas flow modification means in EU '480. Thus, the Examiner has not met the legal or technical burden in finding equivalency element (c) of Claim 1. Accordingly, the Examiner has not established a *prima facie* case of obviousness and the rejection should be withdrawn.

3. The Examiner's contention that EU '480 inherently discloses a "means for decreasing gas stream velocity and increasing gas flow uniformity is technically and legally inadequate.

As noted in part 2 of this Section, the Examiner contends that EU '480 discloses a means that decreases the gas stream velocity and increases gas flow uniformity since *prima facie* anticipation is established by identical or substantially identical structures (citing *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CPA 1977)). However, the structures of the present invention and EU '480 are not "identical nor substantially identical." For example, the present invention utilizes outwardly flaring walls to decrease the gas flow velocity. EU '480, on the other hand, utilizes a downstream tapered conical section which effectively increases the gas flow velocity. Further, EU '480 contains a burner disposed directly in the pathway of the gas flow which serves to disrupt flow uniformity. The present invention does not utilize any such burner. Moreover, the present invention utilizes perforated walls to ensure an even gas flow. EU '480 does not contain perforated walls. Of course, there are other differences between the inventions. With such significant differences, *In re Best* does not apply.

In short, element (c) of Claim 1 does not appear explicitly in EU '480. Further, the structures of the present invention and EU '480 are so radically different, the Examiner's reliance on *In re Best* to assert anticipatory functionality is fundamentally incorrect.

Accordingly, the Examiner's rejection is improper and must be withdrawn. Reversal by the Board is respectfully requested.

#### B. Claims 2 and 3

The Examiner's rationale for rejecting Claims 2 and 3 is as follows:

Regarding claims 2 and 3, the flow gas modification means of EU '480 inherently provides a gas stream entering the gas phase reactor with a velocity profile exhibiting not more than about 10% or 5% velocity deviation from an average gas stream velocity at the upstream end of the at least one catalyst

bed, since the EU '480 discloses the gas flow modification means of the claimed invention. (Final Office Action dated November 1, 2006, p. 3).

Claims 2 and 3 depend from Claim 1 and are submitted to be separately patentable. In addition, Claims 2 and 3 depend from Claim 1, which is submitted to be allowable for the reasons stated above. It is black letter law that a dependent claim contains each and every limitation of the underlying independent claim. In this case, the Examiner has not proved that each and every element of the underlying independent claim is found in any of the primary references as required by element (3) of MPEP § 2143. Therefore, the Examiner has not established a *prima facie* case for at least the elements of independent Claim 1.

Accordingly, for this reason alone the Examiner's rejection of Claims 2 and 3 is improper and should be withdrawn.

1. The Examiner's Contention that EU '480 Inherently Discloses a "Gas Phase Reactor With a Velocity Profile Exhibiting not more than About 10% or 5%" is Inadequate

The Examiner appears to make an inherency argument; it is completely misplaced. There is no technological basis for this assertion and it is not in conformance with the MPEP.

According to MPEP § 2112, in order to claim that a feature of a claim is inherent, the "Examiner must provide a rationale or evidence tending to show inherency." In relying upon the theory of inherency, "the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). It is well settled that "[t]o establish inherency, the extrinsic evidence must make clear that the missing descriptive matter **is necessarily present** in the thing described in the reference, and that it would be so recognized by person of ordinary skill." MPEP § 2112 (*citing In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999)) (emphasis added).

In this case the Examiner has not met his *prima facie* case for inherency, and moreover, is technically wrong. Initially, for the reasons described above, EU '480 does not disclose a gas flow modification means are required by element (c) of Claim 1. However, even assuming, *arguendo*, that it does, there is no evidence that any such gas flow modification means actually makes the gas flow more uniform. EU '480 discloses a combustion chamber (15) with several outlets in several different directions (17). Not only would the flow passing from the impeller to the reactor in EU '480 not become more uniform, it would become entirely disrupted due to this combustion chamber (15). Therefore, the Examiner's inherency argument can not stand in the face of basic scientific principles.

The Examiner has failed to establish that EU '480 even contains a gas flow modification means as required by Claim 1. Since EU '480 does not contain a gas flow modification means, common sense dictates that EU '480 cannot disclose the velocity profiles associated with the gas flow modification means. Indeed, the Examiner does not even attempt to meet his obligations under MPEP § 2112 to provide "technical reasoning" that these features are necessarily present in EU '480; instead, Applicants are only offered a conclusory statement. As a result, the Examiner's specious inherency rejection is misplaced and cannot stand. Even if EU '480 did disclose a gas flow modification means, the rejection is improper.

Appellants must also note that Claim 2 further recites that the uniformity of the gas flow is such that the gas stream entering the gas phase reactor has a velocity profile exhibiting not more than about 10% velocity deviation from an average gas stream velocity at the upstream end of the catalyst bed(s). As noted in the specification at page 11, line 23 to page 12, line 2, the average velocity is defined by the total volumetric flow divided by the cross-sectional area available for flow. Claim 3 further limits the velocity profile to a maximum velocity deviation of 5%.

In the present case, the Examiner cannot establish that EU '480 necessarily discloses the additional 10% and 5% uniformity of Claims 2 and 3. Nowhere does EU '480 disclose or suggest the features of Claims 2 and 3. Indeed, there is no support in EU '480, nor has the Examiner provided any foundation for this allegation.

EU '480 is directed to a muffler system comprising a passive exhaust gas flow system through a combustion chamber. It does not disclose, as described above, a gas flow modification means in accordance with the present invention. Nor does it disclose an impeller for moving the gas stream.

In contrast, the present application utilizes a series of motorized fans, flow control devices, and perforated walls to carefully control reaction conditions of NO<sub>x</sub> containing gases created from a complex industrial process. The concentration and volume of waste gases in the complex petrochemical complex are not equivalent to the exhaust gas profile of an automobile. Consequently, there is no evidence that the exhaust gases are similar. Indeed, the widely disparate technologies suggest greatly differing gas components, concentrations, and volumes.

In short, controlling the flow from an automobile's exhaust and controlling the flow from a large-scale industrial process are very different. Since the processes are so disparate, there is no evidence that even if EU '480 disclosed a gas flow modification means, it would exhibit a similar gas flow velocity reduction profile, especially if applied to a large scale industrial process. At best, EU '480 *could possibly* disclose such a feature (though technically highly improbable in light of EU '480's combustion chamber (15)), but there is no evidence that EU '480 *necessarily* discloses such a feature as required by the MPEP.

Thus, under MPEP § 2112, the Examiner cannot establish that EU '480 inherently teaches the elements of claims 2 and 3. Accordingly, the Examiner's rejection under 35 U.S.C. §

102 (b) is improper and must be withdrawn. Reversal by the Board of the rejections of Claims 2 and 3 is respectfully requested.

C. Claim 15

1. The Examiner's contention that EU '480 discloses a plurality of blades is wrong.

The Examiner rejected Claim 15 by stating that "EU '480 discloses the fan (7) impeller includes a plurality of blades as shown in Figure 1."

As previously stated, a rejection under 35 U.S.C. § 102(b) is improper unless a single reference discloses each and every element of the claimed invention. Regarding Claim 15, the Examiner's rejection falls far short of this requirement.

Claim 15 depends from Claim 14 and is submitted to be separately patentable; it recites that each blade unit attached to and extending radially outward from a circumferential periphery of the impeller "comprises *two* blades." The claimed twin blade units are described at page 9, lines 5 to 14 of the specification and are illustrated at Fig. 4 of the drawings.

EU '480 does *not* disclose or suggest a plurality of Appellants' two-blade units or any equivalent thereof. Contrary to the Examiner's unsupported assertion, the impeller of fan 7 of the EU '480 device includes a plurality of radially extending *single* blades. Nowhere in the specification or drawings is a dual blade impeller shown or described.

Accordingly, the Examiner's rejection under 35 U.S.C. § 102 (b) is improper and must be withdrawn. Reversal of the rejection of Claim 15 by the Board is respectfully requested.

II. REJECTION UNDER 35 U.S.C. §103(a) OVER YAMAGUCHI

The Examiner rejected claims 1, 21-23, 31, 34-35, and 38 under 35 U.S.C. § 103(a) as being unpatentable over Yamaguchi, United States Pat. No. 5,282,355 (hereinafter "Yamaguchi").

Specifically, the Examiner stated:

Yamaguchi discloses a system for catalytically treating a furnace flue gas (Fig. 2), which comprises: a) gas phase reactor containing a catalyst (6) for the treatment of the flue gas in at least one catalyst bed (Col. , lines 50-55) having an upstream end and a downstream end for removal of NO<sub>x</sub>; b) an axial fan (gas turbine 1) positioned upstream of the at least one catalyst bed and downstream of furnace and having a rotatable impeller (inherent feature of gas turbine) for moving the flue gas from the furnace through the gas phase reactor; and means for recycling a portion of the flue gas (via component 10) from downstream of the axial fan to a convection section (section 4). Note, the convection section 4 has a front conical transition duct which constitutes the gas flow modification means for decreasing the gas velocity and increasing gas flow uniformity. (Final Office Action dated November 1, 2006, p. 4).

It is well settled that in order for a claimed invention to be obvious, either alone or in view of a combination of references, three criteria must be met: 1) there must exist a suggestion or motivation to modify the reference or combine reference teachings; 2) there must be a reasonable expectation of success with regards to the modification or combination; and 3) the prior art references, when combined, must teach or suggest all of the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); MPEP §§ 2143-2143.03. Contrary to the Examiner's contention, Yamaguchi is missing limitations from the claims of the present invention. As a result, the Examiner has failed to establish a *prima facie* case for obviousness under MPEP §2143.

A. Claim 1

1. The Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because Yamaguchi does not disclose a gas flow modification means.

Yamaguchi fails to disclose a system for catalytically treating a gas stream which comprises "gas flow modification means positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity" as recited in (c) of Claim 1.

The Examiner's sole rationale supporting this rejection is found in paragraph 2 of the Final Office Action, which states:

Note, the convection section 4 has a front conical transition duct which constitutes the gas flow modification means for decreasing the gas velocity. (Final Office Action dated November 1, 2006, p. 4).

The Examiner then relies on *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977) for the proposition that a *prima facie* case of obviousness is established when claimed products are substantially identical in structure to a prior art device or product.

The Examiner's position is completely unsupportable. A plain reading of Yamaguchi does not support the Examiner's contention. Yamaguchi defines element 4 as a flue. Col. 1, lines 21, 31, 37, 45, etc. There is absolutely no mention in the specification of Yamaguchi of a conical transition duct or *any* gas flow modification means. Neither is there anything in the drawings of Yamaguchi which shows gas flow modification means. Indeed, the Yamaguchi drawings are merely system diagrams; one cannot infer from any of the depicted units in the system that a "conical transition duct" is represented. The system diagrams utilize a vaguely trapezoidal shape to indicate the general flow of the gas through the system and its components. Such an ambiguous drawing can not be considered to be an equivalent disclosure of the present application's gas flow modification means that "decreases velocity and increases gas flow uniformity" as required by Claim 1.

Accordingly, Yamaguchi does not disclose or suggest all of the features of Claim 1 and does not support this rejection. Thus, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn. Reversal of this rejection by the Board is respectfully requested.

Further, as stated previously in Section I-A of this Brief, the "means-plus-function" format of element (c) of Claim 1 requires that it be interpreted in accordance with 35 U.S.C. § 112, sixth paragraph and MPEP §2183.



The Examiner is required to provide an explanation and rationale in the Office Action as to why the prior art element is equivalent. MPEP § 2183. In the present case, however, the Examiner's sum total of this analysis is the conclusory statement, "[n]ote, the convection section 4 has a front conical transition duct which constitutes the gas flow modification means for decreasing the gas velocity."

In short, the Examiner failed to perform any of the analysis required by the MPEP in establishing equivalency of a means-plus-function element. Instead of first determining whether the gas flow modification means are equivalent, the Examiner starts his analysis by stating that the elements disclosed in Yamaguchi and the present application are identical. However, merely stating that the devices are the same based on a single undefined element of a schematic system diagram in no way constitutes a proper analysis of a means-plus-function element as mandated by the MPEP. Therefore, his conclusory statements regarding the disclosure element (c) of Claim 1 of the present application should be accorded no weight. Accordingly, the Examiner has not established that there is an equivalent element to element (c) of Claim 1 in Yamaguchi. No feature in Yamaguchi is disclosed as decreasing gas flow velocity *and* increasing gas flow uniformity.

Even the Examiner's own writing reveals that element (4) of Yamaguchi is not equivalent to the means of Claim 1. The Examiner states that these are "means for decreasing velocity" but never mentions Claim 1's requirement to "increase uniformity." Indeed, the Examiner never even addresses this requirement in his rejection.

Finally, in analyzing the Examiner's failure to account for limitation (c) of Claim 1, Applicants note that the Examiner's invocation of *In re Best* is faulty. As before in section I-A of this Brief, the Examiner fails to show that the structures are "identical or nearly identical."

The Examiner never establishes that structure identical or nearly identical to limitation (c) is found in Yamaguchi and therefore his rejection should be withdrawn.

2. The Examiner has failed to establish the *prima facie* case under 35 U.S.C. § 103 because Yamaguchi does not disclose a rotatable impeller for moving the gas stream through the reactor.

In addition, Applicants respectfully submit that EU '480 does not disclose element (b) of Claim 1. Element (b) of Claim 1 recites "an axial fan positioned upstream of the at least one catalyst bed and having a rotatable impeller for moving the gas stream through the gas phase reactor." (Emphasis added).

As previously stated above, a rejection Under 35 U.S.C. § 102(b) requires a showing that a single reference disclose each and every element of a claim. MPEP § 2131; *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). In his rejection of Claim 1, the Examiner completely neglects to analyze the requirement that the axial fan move the gas.

The fan system 100 of the present invention includes a drive motor 121 (Fig. 1) enclosed within a motor housing 122 (Fig. 2) and a rotatable drive shaft 125 for transmitting rotary motion to an impeller assembly 130. Specification, page 8, lines 8-11. In other words, the fan in Appellants' claimed system moves the exhaust gas. In contrast, the fan of the EU '480 device has no motor: it is the exhaust gas which moves the fan. In the English translation of EU '480, at page 2, bottom paragraph it is stated:

Due to these characteristics, the exhaust gases to be cleaned, generally coming from an internal combustion engine, which are routed toward said first intake, **actuate the fan**, giving rise to suction of additional air through said second intake, and the two streams arrive at the afterburning chamber radially stratified with exterior layers formed mainly by fresh air and interior layers formed mainly by hot exhaust gases. (Ex. A, p. 2) (emphasis added).

The interaction between the moving gases and the fan in EU '480 is not the same as that claimed by Appellants. In the instant Claim 1, the fan moves the gases. In EU '480, the exhaust gases move the fan.

Thus, for at least the foregoing reasons, EU '480 does not disclose element (b) of Claim 1 of the instant application. Accordingly, the Examiner's rejection under 35 U.S.C. § 102(b) is improper and must be withdrawn.

Accordingly, Yamaguchi does not disclose or suggest all of the features of Claim 1 and does not support this rejection. Thus, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn. Reversal of this rejection by the Board is respectfully requested.

**B. Claims 21-23, 31, 34 and 38**

The Examiner's rationale supporting a rejection of claims 21-23, 31, 34, and 38 is as follows:

With respect to the recycling portion of the flue gas to the convection section of the furnace located upstream of the axial fan, it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to recycle a portion of the flue gas upstream of the gas turbine to effectively pressurized [sic] and deliver the gas back into the catalytic system for gas treatment and such configuration provides a cost savings by eliminating the need for additional exhaust fan. (Final Office Action dated November 1, 2006, pp. 4-5).

1. The Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because the Examiner has failed to properly analyze the means-plus-function element of Claim 21.

Claims 21-23, 31, 34 and 38 are separately patentable. Element (c) of Claim 21 recites "means for recycling a portion of the flue gas from downstream of the axial fan to a convection section of the furnace located upstream of the axial fan."

As previously stated, this recitation is in the form of "means-plus-function" and the requirements for the examination of "means-plus-function" claims, first stated above in Section I-A of this Brief, are incorporated by reference herein. The Examiner has not met these requirements. Namely, the Examiner has failed to perform any analysis for establishing the equivalency of a means-plus-function element as mandated by MPEP § 2183.

The Examiner's analysis is inadequate because Yamaguchi does not disclose or suggest anything equivalent to element (c) of Claim 21. Attempting to find a structure similar to element (c) of Claim 21, the Examiner points to the recycling system illustrated in Fig. 2 of Yamaguchi and described at Col.1, lines 35-47, which recycles NO<sub>x</sub>-free gas from downstream of the catalyst beds, adds ammonia in vaporizer 11 and cycles ammonia-containing gas via line 12 to a region upstream of the catalyst but *downstream* of the turbine 1. (Final Office Action dated November 1, 2006, pg. 5).

The recycle system described in Yamaguchi is not similar to that of Appellants', nor is it equivalent in operation or result. Referring to Fig. 1 of Appellants' drawings, a portion of the flue gas containing NO<sub>x</sub> is drawn off from the transition section 300 by pipe branches 331. Ammonia is introduced into the system at inlet 338 and the NO<sub>x</sub>-containing recycled flue gas mixed with ammonia is recycled back into the convection section 20 of the furnace, which is *upstream* of the fan system 100. Thus, very intimate mixing of the NO<sub>x</sub>-containing gas and ammonia is achieved *before* entry into the catalyst beds. A uniformity of ammonia concentration is achieved such that deviations in the concentration of ammonia in the flue gas entering the catalyst bed(s) do not exceed 10%. Specification page 15, lines 16-20.

Even the Examiner recognizes this difference. To support his position that element (c) of Claim 21 is disclosed in Yamaguchi, the Examiner conclusorily asserts that "recycling a portion of the flue gas downstream of the axial fan to either upstream or downstream of the axial fan does not alter the mechanism of purifying the flue gas stream." (Final Office Action dated November 1, 2006, p. 5). As noted in Appellants' specification at page 15, lines 13-16:

The recycling of the flue gas helps to reduce fluctuations in the ammonia content of the flue gas entering the catalyst bed by more thoroughly distributing the ammonia.

In a second attempt to obscure the obvious differences between the present invention's recycle and that of Yamaguchi, the Examiner contends that the limitation requiring "recycling a portion of the flue gas stream" is improper because it "is directed to the manner of operating a device which does not differentiate the claimed apparatus from a prior art." (Final Office Action dated November 1, 2006, p. 5) (relying on *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)). As a result, the Examiner did not even address the element.

While it is black letter law that an apparatus claim must be differentiated from a prior art apparatus on a structural basis, "there is nothing inherently wrong about defining some part of an invention in functional terms." MPEP § 2173.05(g) (emphasis added). The Examiner's reliance on *Masham* is completely incorrect. *Masham* simply discounts intended uses for an entire structure; it in no way affects a "means-plus-function" claim limitation.

Limitation (c) of Claim 21 is in the well established means-plus-function format described and codified by statute in 35 U.S.C. § 112, ¶6. It defines the functional aspect of an element of the Claims, not the overall system claim. This is clearly allowable by statute and is codified in case law. See, e.g., *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971). This is clearly a significant difference from Yamaguchi's recycle *after* the beds and does alter the mechanism of purifying the gas stream.

As a result, Yamaguchi fails to disclose element (c) of Claim 21. Accordingly, the Examiner has failed to establish a prima facie case of obviousness under 35 U.S.C. § 103 and the rejection should be withdrawn. Reversal by the Board is respectfully requested.

2. The Examiner's suggestion for the proposed modification of Yamaguchi is not in accordance with the MPEP.

The Examiner's contention that:

“it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to recycle a portion of the flue gas upstream of the gas turbine to effectively pressurized [sic] and deliver the gas back into the catalytic system for gas treatment and such configuration provides a cost savings by eliminating the need for additional exhaust fan”

is not in compliance with the MPEP nor Federal Circuit precedent. (Final Office Action dated November 1, 2006, p. 5).

It is well settled that “if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” MPEP § 2143.01 (citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

The Examiner’s contention is improper because applying his suggestion to Yamaguchi would actually cause Yamaguchi’s invention not to function. Yamaguchi discloses that a portion of the exhaust gas may be recycled into the NO<sub>x</sub> removal system 6 that is located downstream of flue 4, which is located downstream of turbine assembly 1. *See*, Fig. 2 of Yamaguchi. Yamaguchi has no furnace or convection section upstream of turbine 1 to which one could recycle any exhaust gas. Fuel 2 and air 3 are introduced into the Yamaguchi turbine 1, not exhaust gas from the convection section of a furnace. The exhaust gas is generated by the gas turbine 1, not passed through it.

The exhaust gases are comprised of gases that are not flammable or appropriate for combustion in a gas turbine. For example, the exhaust gases are primarily comprised of carbon monoxide, water and NO<sub>x</sub> gases, along with other impurities. As such, any gas located downstream of the gas turbine and pumped upstream through the gas turbine, as required by element (c) of Claim 21 would result in shutting down or severely damaging the gas turbine. In other words, pumping in these gases would actually prohibit the proper operation of the gas turbine and effectively disable the system disclosed in Yamaguchi.

As a result, the Examiner's rationale directly contradicts the MPEP. Since the Examiner's proposed modification would effectively destroy the operability of the system described in Yamaguchi (i.e., the turbine would not operate) the Examiner's modification would, at a minimum, render the prior art invention unsatisfactory for its intended purpose. As such, the Examiner's proposed modification is improper. Thus, the Examiner has failed to establish a proper motivation to make the proposed modification.

Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 for failing to include every limitation found in the claims and for proposing a modification that would disable the operability of the prior art and the rejection must be withdrawn. Reversal of this rejection by the Board is respectfully requested.

3. The Examiner has not established a *prima facie* case of obviousness for the dependent claims because he has failed to establish a *prima facie* case of obviousness for underlying independent Claim 21.

Claims 22, 23, 31, 34, and 38 depend from, and merely add further limitations to claim 21. Since the Examiner has failed to establish a *prima facie* case for obviousness of independent claim 21, under Yamaguchi because, *inter alia*, it fails to disclose each and every claim limitation, it follows that Yamaguchi cannot disclose each and every claim limitation of these dependent claims. As such, the Examiner's rejection of these claims is improper and must be withdrawn.

In summary, altering the recycle stream of Yamaguchi to discharge upstream of the gas turbine would render the system completely unsuitable for its intended purpose. In addition, there is no motivation provided in the Yamaguchi reference to do so, and even if it were done, it would not provide the system with the same gas treatment as that of Appellants' claimed system.

Accordingly, Yamaguchi does not support a finding of obviousness. Reversal of the rejection by the Board is respectfully requested.

C. Claim 35

The Examiner rejected Claim 35 by stating that “Yamaguchi discloses a gas turbine, which inherently has blade units comprise [sic] of blades extending radially outward from the impeller.” (Final Office Action dated November 1, 2006, p. 5).

This analysis, however, does not establish a *prima facie* case of obviousness under MPEP § 2143, which requires that each and every element of a rejected claim be disclosed.

Claim 35 depends from Claim 34 and is separately patentable. Claim 35 recites that each blade unit attached to and extending radically outward from a circumferential periphery of the impeller comprises *two* blades. Contrary to the Examiner’s unsupported assertion, Yamaguchi does *not* disclose any such feature or equivalent thereof. The argument presented above in Section I-C of this Brief in connection with the rejection of Claim 15 over EU ‘480 is incorporated by reference herein. In short, there is absolutely no evidence that Yamaguchi inherently discloses the features of Claim 35.

Accordingly, the Examiner’s rejection under 35 U.S.C. § 103(a) is improper and must be withdrawn. Reversal of this rejection of Claim 35 by the Board is respectfully requested.

III. REJECTION UNDER 35 U.S.C. §103(a) OVER EU ‘480

A. Claims 2 and 3

The Examiner rejected Claims 2 and 3 under 35 U.S.C. § 103(a) as being unpatentable over EU ‘480. According to the Examiner:

It appears EU ‘480 provide [sic] a gas flow modification means with the gas stream entering the gas phase reactor has a velocity profile exhibiting not more than 10% or 5% velocity deviation from an average gas stream velocity at the upstream end of the at least one catalyst bed. (Final Office Action dated November 1, 2006, p. 6).

1. The Examiner’s rejection is merely a reiteration of his incorrect application of the requirements of a proper inherency rejection.



To support a rejection of these claims, the Examiner contends that EU '480 inherently provides a gas stream entering the gas phase reactor with a velocity profile exhibiting not more than about 10% or 5% velocity deviation from an average gas stream velocity at the upstream end of the catalyst bed. As previously discussed in Section I-A, the requirements for an inherency rejection are exacting. The mere fact that a certain thing may result from a given set of circumstances is insufficient to establish a proper inherency rejection. MPEP § 2112 (*citing In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999))

As previously discussed in Section I-A-3 of this Brief, nowhere does EU '480 disclose or suggest decreased velocity or increased gas uniformity. Indeed, there is no support in EU '480, nor has the Examiner provided any foundation for this allegation. Indeed, the only evidence proffered by the Examiner is his misplaced reliance on *In re Best* which is used to prop up the Examiner's erroneous inherency argument. In other words, the Examiner contends that EU '480 discloses an equivalent gas flow modification means, and as such, it must necessarily contain the same velocity profile characteristics. The Examiner's reliance on *Best* here is erroneous for the same reasons enumerated in Section I-A-3. Namely, the Examiner has not shown (or even attempted to show) that the structures are "identical or substantially identical."

In addition, the Examiner offers no actual objective evidence to support his contentions. This is an insufficient inherency rejection under the MPEP. This rationale is more fully stated in Section I-B of this Brief. In the interests of economy, Appellants will not reiterate those arguments. Rather, the arguments are herein incorporated by reference.

In summary, the Examiner has failed to examine the instant application in accordance with the MPEP. In addition, EU '480 does not teach or suggest all of the structural limitations of the claims as required by MPEP § 2143 for establishing a *prima facie* case of obviousness. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35

U.S.C. § 103 and the rejection must be withdrawn. Reversal of this rejection by the Board is respectfully requested.

#### IV. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF SURETTE

The Examiner rejected Claim 4 under 35 U.S.C. § 103(a) as being unpatentable over EU '480 in view of Surette, United States Patent No. 5,632,142 (hereinafter "Surette"). More specifically, the Examiner contends that:

EU '480 discloses the axial fan (7) includes a housing (casing 30-31) and a flared portion (convergent section 13 to wall 34) but fails to disclose a tail cone includes [sic] a distally pointing tapered end portion. Surette teaches a gas turbine engine 101 with a tail cone (nozzle plug 117) to minimize turbulence and provide a smooth uniform flow path to the diffuser 115. Thus it would have been obvious in view of Surette to one of having ordinary skill in the art to modify the turbine structure of EU '480 with a gas turbine with a tail cone as taught by Surette in order to provide a smooth flow downstream. (Final Office Action dated November 1, 2006, p. 6).

1. The Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because neither EU '480 nor Surette discloses a gas flow modification means.

The Examiner fails to establish element (3) in establishing a *prima facie* case of obviousness in accordance with MPEP § 2143. In other words, the Examiner has not established that the references, when combined, contain each and every element of Claim 4.

Claim 4 depends from Claim 1 which is submitted to be patentable for the reasons enumerated in Sections I-A and II-A of this Brief. In addition, Claim 4 is considered to be separately patentable. Claim 4 contains each and every element of Claim 1 with the additional recitation that the axial fan includes "a housing and a tail cone, and the gas flow modification means includes a distally pointing tapered end portion of the tail cone and a flare portion of the housing having a gradually increasing diameter."

The Examiner again fails to make a *prima facie* case of obviousness, because, as described above in Section I of this Brief, EU '480 does not disclose "gas flow modification means positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity." Moreover, Surette does not cure this deficiency. Surette discloses a stationary gas turbine power system and related method which includes a bell shaped wall 119, diffuser 115, and transition duct 109, for channeling the exhaust from turbine engine 101 into a heat recovery steam generator 23. A conical nozzle 117 creates a jet pumping action which draws air into the exhaust gas stream from closed chamber 123 through opening 121. One of ordinary skill in the art would readily appreciate that the additional air from chamber 123, sucked in due to the low pressure created by the nozzle 117 and converging walls of 119 would cause flow turbulence, thereby disrupting flow uniformity. Accordingly, Surette does not disclose a gas flow modification means to increase flow uniformity as required by Claim 4.

As a result, none of the combined references teach every element of Claim 4. Thus, the Examiner's rejection under 35 U.S.C. § 103 is improper and should be withdrawn.

2. The Examiner has failed to Establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because he has improperly combined the references.

The Office Action argues that it would be obvious to modify the turbine structure of EU '480 with the gas turbine with a tail cone as taught by Surette. (Final Office Action dated November 1, 2006, p. 6).

An obviousness rejection, however, is improper unless the prior art relied upon suggests the proposed combination, *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990), as reflected in element (1) of MPEP § 2143. Indeed, the Examiner "has the burden to show some

teaching or suggestion in the references to support their use in the particular claimed combination.” MPEP § 2143.01; *Smithkline Diagnostics, Inc. v. Helena Laboratories Corp.*, 859 F.2d 878, 887, 8 USPQ2d 1468, 1475 (Fed. Cir. 1988); *see also, In re Mayne*, 104 F.3d 1339, 1342, 41 USPQ2d 1451, 1454 (Fed. Cir. 1997) (“When relying on numerous references or a modification of prior art, it is incumbent upon the Examiner to identify some suggestion to combine references to make the modification.”). A finding of obviousness is not warranted if, as in the present case, there is an absence of such a teaching, suggestion, or motivation. MPEP § 2143.01; *See Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573, 1579, 42 USPQ2d 1378, 1383 (Fed. Cir. 1997). Indeed, it is well settled that: “Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under § 103, teachings of references can be combined only if there is some suggestion or incentive to do so.” MPEP § 2143.01; *ACS Hospital Systems Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

The cited references provide no motivation or incentive for the combination suggested by the Examiner. Absent the use of Appellants’ own disclosure, there is no reason why one skilled in the art, upon reading EU ‘480 and Surette, would be motivated to combine the nozzle 117 and diffuser 115 of the Surette gas turbine system with the exhaust gas purifier for internal combustion engines of EU ‘480. Indeed, one of ordinary skill in the art would not consider Surette because it would be obvious that the air entering through 121 would disrupt the uniform flow, the very aspect trying to be achieved by the present invention. Further, the Surette device is directed to relatively large stationary installations for power plants, whereas the EU ‘480 device is intended to be mounted to a motor vehicle to purify engine exhaust gas.

Therefore, the obviousness rejection could only be the result of a hindsight view with the benefit of Appellants' specification. This type of analysis is inappropriate:

To draw on hindsight knowledge of the patented invention, when the prior art does not contain or suggest that knowledge, is to use the invention as a template for its own reconstruction—an illogical and inappropriate process by which to determine patentability. The invention must be viewed not after the blueprint has been drawn by the inventor, but as it would have been perceived in the state of the art that existed at the time the invention was made.”  
*Seasonics v. Aerosonic Corp.*, 38 USPQ2d 1551, 1554 (Fed. Cir. 1996)  
(citations omitted).

See also, MPEP § 2145. In short, the combination advanced by the Examiner is not legally proper. Under the circumstances, Appellants submit that the Examiner has succumbed to the “strong temptation to rely on hindsight.” *Orthopedic Equipment Co. v. United States*, 702 F.2d 1005, 1012, 217 USPQ 193, 199 (Fed. Cir. 1983). However, “it is wrong to use the patent in suit as a guide through the maze of prior art references in the right way so as to achieve the result of the claim in suit. Monday morning quarterbacking is quite improper when resolving the question of non-obviousness.” MPEP § 2145; *Id.* Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn.

In summation, this rejection has relied upon art which does not contain each and every limitation of the instant claims, has not established the proper motivation to combine the references, and improperly relied on the Appellants' specification as a roadmap to cobble several unrelated references together. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103. Reversal of this rejection by the Board is respectfully requested.

V. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 AND SURETTE AS APPLIED TO CLAIMS 1 AND 4 IN FURTHER VIEW OF TYLER AND ISHIKAWA

The Examiner rejected claims 5, 50, 51, and 53-55 under 35 U.S.C. § 103 as being unpatentable over the applied references as applied to Claim 4 above (i.e., EU '480 in view of Surette) and further in view of Tyler et al., United States Pat. No. 2,936,846 (hereinafter "Tyler") and Ishikawa et al, United States Patent No. 5,043,146 (hereinafter "Ishikawa").

The Examiner stated that:

The applied references disclose a transition duct (convergent section 13 to wall 34 of EU '480 and bell shaped wall 119 of Surette) which flare outward so as to gradually increase cross-sectional area available to gas stream flow and the circumference of the housing gradually increases from a position of the housing at the axial fan to the outlet of the housing but fail to disclose the transition duct having perforated walls. Tyler teaches a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Tyler in order to reduce the noise generated from the exhaust gas. (Final Office Action date November 1, 2006, p. 7).

Applicants note that Claims 5, 51 and 53 are based on Claim 1 and all arguments for its patentability apply to these claims. Further Claims 5, 51 and 53 are patentable in their own right.

A. Claims 5, 50, 51 and 53

1. The Examiner's reliance on Tyler is misplaced because it is non-analogous art.

MPEP § 2141.01(a) states that "[i]n order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the filed of the applicant's endeavor, or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." (Internal citations omitted). Further, the MPEP discloses that a reference is

reasonably pertinent if “the matter with which it deals logically would have commended itself to an inventor’s attention in considering his problem.” *Id.* (Citations omitted).

Appellants submit that Tyler is an inappropriate reference because it is non-analogous art. Tyler is directed to a ground exhaust noise suppressor, especially for aircraft or other type of jet engine wakes. Tyler discloses the use of a chamber 36 having perforations 48 to allow the passage of exhaust gas therethrough to reduce noise. This technology has no bearing on increasing the efficacy of a catalyst bed, a chemical art. Clearly the technical fields are different. Indeed, one seeking to improve the performance of NO<sub>x</sub> removal through the use of a catalyst bed would not logically look to a reference for quieting jet engines. Further, jet engines are not suitable to use with catalyst beds. The airflow from the jet engine would disrupt the proper operation of the catalyst bed. As such, the reference is not reasonably pertinent and the reference is not analogous art. Since the reference is non-analogous, it is improper to rely on it in making a 35 U.S.C. § 103 rejection.

Moreover, under MPEP § 2141, in order to rely on the similar structure of an element in divergent fields of art the prior art must teach the same functionality of the structurally similar element. Although Tyler and the present application each utilize perforated walls, the underlying rationale for each usage is drastically different. Tyler discloses that the purpose of its perforated walls is to allow the passage of exhaust gas through perforations 48 so as to alter the noise spectrum to higher, less audible frequencies of sound. *See*, Col. 4, lines 53-75. The examiner ***admits*** this function in the Office Action. This is in stark contrast to the present invention, which utilizes perforated walls to decrease gas stream velocity and increase gas flow uniformity. Moreover, Tyler discloses that the incoming gas stream already has a constant velocity profile. Col. 3, lns. 46-49. Clearly, the functions of the perforated walls are different from those of the present invention which is structured to make a uniform gas profile.

As such, the reference is not reasonably pertinent and the reference is not analogous art. Since the reference is non-analogous, it is improper to rely on it in making a 35 U.S.C. § 103 rejection. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn. Reversal of this rejection by the Board is respectfully requested.

2. The Examiner has improperly combined Tyler and EU '480 because there is no motivation to combine the references.

Even if Tyler were considered analogous art, the Examiner has not met his burden in establishing a *prima facie* case of obviousness in accordance with MPEP § 2143. More specifically, the Examiner has failed to establish a proper motivation for the combination of references as mandated by MPEP § 2143.

As previously discussed, it is well settled that an obviousness rejection is improper unless the prior art relied upon suggests the proposed combination, *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990), as reflected in element (1) of MPEP § 2143. Indeed, the Examiner "has the burden to show some teaching or suggestion in the references to support their use in the particular claimed combination." MPEP § 2143.01. Further, "if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." MPEP § 2143.01 (citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

The Examiner's proffered motivation to combine the references is found in the Final Office Action at paragraph 5:

Thus, it would have been obvious in view of Tyler '846 to one having skill in the art to modify the transition duct of the applied references having perforated walls as taught by Tyler '846 in order to reduce the noise generated by the exhaust gas.



However, this rationale would destroy the operability of EU '480. The EU '480 device employs an acoustically insulated outer casing to suppress noise. However, Tyler does not employ acoustic insulation to reduce noise, but rather shifts the frequency of the sound from audible low frequency noise to high frequency inaudible sound. Substituting the perforated chamber 30 of Tyler with the outer casing of EU '480 would permit the engine exhaust gas to escape rather than flow through the device for purification. This would negate the intended function of the EU '480 device. As such, there can be no motivation to combine references. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness in accordance with MPEP § 2143 and the rejection must be withdrawn.

In summation, this rejection has relied upon non-analogous art and the Examiner has not established the proper motivation to combine the references. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103. Reversal of this rejection by the Board is respectfully requested.

B. Claims 54 and 55

With respect to the rejection of claims 54 and 55, the Examiner stated:

Ishikawa teaches a flow controller 3 or guide vane unit (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer. (Col. 1, lines 31-38). Thus it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Ishikawa<sup>2</sup> in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer. (Final Office Action dated November 1, 2006, p. 7).

Applicants note that Claims 54 and 55 are based on Claim 1 and all arguments for its patentability apply to these claims. Further Claims 54 and 55 are patentable in their own right.

1. The Examiner has improperly combined Ishikawa, Tyler and EU '480 because there is no motivation to combine the references.

Initially, Appellants submit that the Examiner has failed to establish element (1) of MPEP § 2143 regarding the requirements for a proper obviousness rejection. In other words, the Examiner has not sufficiently demonstrated a motivation to combine the references.

As stated above, the Examiner contends that the combination of Ishikawa with Surette and EU '480 is proper because it would minimize the formation of vortexes and produce a uniform exhaust flow. (Office Action dated November 1, 2006, p. 7). EU '480, however, discloses neither the formation of vortexes nor the desirability of a uniform exhaust gas flow. Surette also fails to disclose either of these features. Therefore, there is no explicit rationale for the combination proposed by the Examiner. Indeed, none of the references cited by the Examiner are directed toward increasing the uniformity of a gas flow.

As a result, the Examiner has not established that any of the references teach or suggest a motivation for their combination. Accordingly, the Examiner's rejection is improper and should be withdrawn.

#### VI. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF TYLER AND ISHIKAWA

The Examiner rejected Claims 6 and 56 under 35 U.S.C. § 103(a) as being unpatentable over EU '480 in view of Tyler and Ishikawa. The Examiner utilizes the exact same rationale as his rejection of Claims 5, 50, 51, and 53-55 as enumerated in Section V of this brief.

Specifically, the Examiner stated:

The applied references disclose a transition duct (convergent section 13 to wall 34 of EU '480 and bell shaped wall 119 of Surette) which flare outward so as to gradually increase cross-sectional area available to gas stream flow

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<sup>2</sup> Ishikawa does not disclose perforated walls. Rather, the Examiner utilizes Tyler for the teaching of perforated duct walls. The Appellants assume this is a typographical error.

and the circumference of the housing gradually increases from a position of the housing at the axial fan to the outlet of the housing but fail to disclose the transition duct having perforated walls. Tyler teaches a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Tyler in order to reduce the noise generated from the exhaust gas. (Final Office Action date November 1, 2006, p. 7).

In applying Ishikawa, the Examiner reiterated:

Ishikawa teaches a flow controller 3 or (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer. (Col. 1, lines 31-38) and to provide a uniform gas flow. Thus, it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of EU '480 having perforated walls as taught by Ishikawa<sup>3</sup> in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer. (Final Office Action dated November 1, 2006, p. 7).

Since this rejection is identical to the Examiner's rejection in Section V of this Brief, the same arguments apply. Namely, the Examiner has improperly utilized prior art under MPEP § 2141.01(a). In addition, the Examiner has not met his burden in establishing a *prima facie* case of obviousness in accordance with MPEP § 2143 for underlying independent Claim 1.

The rationale for the misapplication of these principles is fully set out in Section V of this Brief. In the interests of economy, Appellants fully reiterate and incorporate the complete arguments set forth in Section V of this Brief. In short, the Examiner has mistakenly relied upon non-analogous art in violation of established principles enumerated in MPEP § 2141.01(a) and has failed to proffer a proper rationale to combine the references as mandated by MPEP § 2143.

Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejection should be withdrawn.

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<sup>3</sup> See footnote 2 above.

A. Claim 6

Applicants note that Claim 6 is based on Claim 1 and all arguments for its patentability apply to these claims. Further Claim 6 is patentable in its own right.

1. The combination of EU '480, Tyler and Ishikawa fails to disclose outwardly flaring walls.

As discussed in numerous other Sections of this Brief, a rejection under 35 U.S.C. § 103 is improper unless the prior art references teach each and every limitation of the rejected claim. MPEP § 2143. Appellants respectfully submit that the Examiner's rejection is improper because none of the references teach outwardly flaring walls.

Claim 6 recites a transition duct having perforated walls which flare outwardly to gradually increase cross-sectional area available to gas stream flow. EU '480 does not show a transition duct which has perforated walls, and does not show walls which flare outwardly to gradually increase cross-sectional area available to gas stream flow. EU '480 instead shows a convergent area 13 downstream of blades 11 that restricts the cross-sectional area available to gas flow. Moreover, burner 15 is positioned in the gas flow path downstream of the convergent section 13. EU '480 states (in translation, page 5, second paragraph):

Starting from blades 11, the internal wall of the casing of the device forms a convergent section 13 which connects the general intake section of the device to the smaller section of passage available in afterburning chamber 14 around burner 15. (Emphasis added.)

It is clear, then, that EU '480 does not disclose or suggest the invention of Claim 6. Nor does Tyler or Ishikawa cure the deficiencies of EU '480. Tyler is directed to a ground exhaust noise suppressor. (See generally, Col. 2). Indeed, Tyler discloses a perforated cylinder 36 with a conically converging rear section 38 (See, col. 4, lines 43-48). Tyler does not disclose or suggest outwardly flared perforated walls as contemplated in Claim 6. Ishikawa does not disclose or

suggest anything remotely suggestive of the transition duct of the present invention as claimed in Claim 6.

Therefore, the Examiner's combination of EU '480, Tyler, and Ishikawa fails to disclose each and every claim element of the present application. Accordingly, the Examiner has not established a *prima facie* case for obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn. Reversal of the rejection of Claim 6 by the Board is respectfully requested.

B. Claim 56

The Examiner makes the same rejection regarding Claim 56 as he did in regards to Claim 55. That is, the Examiner stated:

Ishikawa teaches a flow controller 3 or (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer. (Col. 1, lines 31-38) and to provide a uniform gas flow. Thus, it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of EU '480 having perforated walls as taught by Ishikawa<sup>4</sup> in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer. (Final Office Action dated November 1, 2006, p. 7).

Applicants note that Claim 56 is based on Claim 1 and all arguments for its patentability apply to this claim. Further Claim 56 is patentable in its own right.

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

Claim 56 depends from Claim 6 and further recites, *inter alia*, a guide vane unit with louvers for redirecting the flow of gas which is located at the inlet of the transition duct and is submitted to be separately patentable.

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<sup>4</sup> Again, Appellants point out that Ishikawa does not disclose perforated walls. Tyler, however, does disclose perforated walls.

Since the Examiner's rejection is identical to that enumerated in Section V-B of this brief, the same arguments apply. Namely, the Examiner has not met his burden in establishing a *prima facie* case of obviousness in accordance with MPEP § 2143.

The rationale for the misapplication of these principles is fully set out in Section V-B of this Brief. In the interests of economy, Appellants fully reiterate and incorporate the complete arguments set forth in Section V of this Brief. In short, the Examiner has failed to proffer a proper rationale to combine the references as mandated by element (1) of MPEP § 2143.

Accordingly, the Examiner's rejection is improper and should be withdrawn.

2. None of the references disclose louvers.

Claim 56 requires that the guide vanes further be comprised of louvers. As previously discussed, in order to establish a *prima facie* case of obviousness under 35 U.S.C. § 103, the Examiner must show that each and every claim limitation is disclosed in the cited references. MPEP § 2143.

In this instance, the Examiner never even addresses this element of Claim 56. Instead, he contends that Ishikawa contains "a flow controller." In his previous rejection of Claims 55 and 56, the Examiner identified the flow controller as "guide vanes." It is interesting to note that the Examiner omitted this phrase when cutting and pasting this rejection. This indicates that even the Examiner does not consider Ishikawa to contain "louvers." As a result, the Examiner never addresses a limitation of the rejected Claim. This is improper under the MPEP and legally insufficient to establish a *prima facie* case of obviousness under 35 U.S.C. § 103.

Since the Examiner does not even assert that any of the references disclose louvers as required by Claim 56, the Examiner has failed to establish a *prima facie* case under 35 U.S.C. § 103 because the references do not teach each and every element of the claim.

In summation, the Examiner has merely presented the same arguments from a previous rejection, and the Appellants have been forced to reiterate their position regarding the impropriety of this rejection. Namely, the Examiner has improperly relied on non-analogous art in contravention to MPEP 2141.01(a) and has failed to establish a *prima facie* case of obviousness because he has failed to satisfy elements (1) and (3) of MPEP § 2143.

## VII. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF YAMAGUCHI

The Examiner rejected Claims 7 and 18-20 under 35 U.S.C. § 103(a) as being unpatentable over EU '480 in view of Yamaguchi. More specifically, the Examiner stated:

EU '480 fails to disclose means for recycling a portion of the gas stream from downstream of the axial fan to a position upstream of the axial fan. Yamaguchi teaches a portion of the NOx-free exhaust gas stream is recirculated back to the [sic] position upstream of the axial fan to facilitate vaporizing the aqueous ammonia prior to injecting to the catalyst layer of the NOx system. Thus it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to modify the exhaust treatment system of EU '480 with a recycling stream as taught by Yamaguchi in order to facilitate vaporizing of the aqueous ammonia to be used in the catalyst system. (Final Office Action dated November 1, 2006, p. 9).

Applicants note that Claims 7 and 18-20 are based on Claim 1 and all arguments for its patentability apply to these claims. Further Claims 7 and 18-20 are patentable in their own right.

1. The combination of EU '480 and Yamaguchi fails to disclose recycling a portion of the exhaust gas upstream of the axial fan.

The Examiner has failed to establish a *prima facie* case for obviousness under 35 U.S.C. § 103 because the Examiner has failed to prove that each and every element of Claim 7 is disclosed by the combined references as required by element (3) of MPEP § 2143.

Claim 7 depends from Claim 1 and further recites the feature of recycling a portion of the gas stream from downstream of the axial fan to a position upstream of the axial fan. Referring to

Fig. 1 of Appellants' drawings and page 15, lines 1-20, it can be seen that flue gas from the chamber portion 303 is drawn through branches 331 of the recycle manifold 330 and directed into the convection section 20 of the furnace. Thus, a portion of the gas stream is recycled from downstream of the axial fan 130 to a position upstream of the axial fan. The Examiner argues that such an arrangement is disclosed by Yamaguchi:

Yamaguchi '355 teaches a portion of the NO<sub>x</sub>-free exhaust gas is recirculated back to a position upstream of the axial fan (best understood by Examiner to be the front back of the catalyst system to facilitate vaporizing the aqueous ammonia prior to injecting to the catalyst layer of the NO<sub>x</sub> removal system.<sup>5</sup>

This is simply not true. The input and exhaust of the recycling system of Yamaguchi are both downstream of the gas turbine 1. See Fig. 2 of Yamaguchi. Yamaguchi discloses the recycling of gas from downstream of the catalyst system 6 to a position upstream of the catalyst system 6. Yamaguchi does not disclose recycling gas from downstream of the axial fan to a position upstream of the axial fan.

Moreover, unlike Appellants' claimed system, Yamaguchi does not employ the gas turbine to move exhaust gas from the convection section of a furnace to a catalytic system for removing NO<sub>x</sub>. Rather, fuel 2 and oxygen 3 are combusted in gas turbine 1 of Yamaguchi and generate exhaust gas. There is no suggestion in Yamaguchi to recycle any exhaust gas upstream of the gas turbine. Indeed, as described in Section II of this brief, utilizing the downstream gases would prohibit the gas turbine from functioning properly, effectively destroying the efficiency of the system disclosed in Yamaguchi.

Accordingly, none of the cited references, taken individually or in combination, disclose or suggest the invention claimed by Appellants herein.

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<sup>5</sup> The Examiner contradicts himself here. In paragraph 2 of the Office Action, the Examiner admits that the recycle is downstream of the axial fan. However, in his view, it would have been obvious to modify it to a position upstream of the axial fan to remove the need for a second exhaust fan.



In summation, the Examiner has failed to establish a *prima facie* case of obviousness because he has failed to satisfy element (3) of MPEP § 2143. Namely, the Examiner has not shown that the combined references disclose each and every element of Claim 7. Finally, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims. In light of the foregoing, Appellants respectfully request reversal of this rejection by the Board. Accordingly, Claims 7 and 18-20 are also submitted to be allowable. Reversal of the rejection of Claims 7 and 18-20 by the Board is respectfully requested.

#### VIII. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF BALLING

The Examiner rejected Claims 9, 10, 12 and 13 under 35 U.S.C. § 103(a) as being unpatentable over EU '480 in view of Balling et al, United States Patent No. 5,397,545 (hereinafter "Balling"). In the Examiner's view:

EU '480 discloses the catalyst elements 20 but fails to disclose the catalyst bed includes a plurality of stackable, individually separable modules containing one or more materials selected from the group consisting of vanadium oxide, aluminum oxide, titanium oxide, tungsten oxide, molybdenum oxide and zeolite. Balling teaches a plurality of stacked honeycomb catalytic converters (8, 10, 12, 14, 16) (Col. 4, lines 65-68) made of vanadium pentoxide...to facilitate the conversion of nitrogen and carbon dioxide (Col. 6, lines 18-24). Thus, it would have been obvious in view of Balling to one having ordinary skill in the art to modify catalyst elements of EU '480 with honeycomb catalyst converters as taught by Balling to facilitate the conversion of NO<sub>x</sub> to nitrogen. (Final Office Action dated November 1, 2006, pp. 10-11).

Applicants note that Claims 9, 10, 12 and 13 are based on Claim 1 and all arguments for its patentability apply to these claims. Further Claims 9, 10, 12, and 13 are patentable in their own right.

1. The Examiner has improperly combined the references because he has not established a motivation for their combination.

As previously stated in Section IV of this Brief, MPEP § 2145 dictates that using the Appellants' specification as a guide to cobble together references is the impermissible use of hindsight which fails to establish a proper motivation to combine the references as required by element (1) of MPEP §2143.

In this rejection, the prior art references relied upon by the Examiner fail to provide any teaching, suggestion or motivation for the combination asserted by the Examiner in rejecting the pending claims. More specifically, EU '480 does not disclose the desirability of utilizing honeycomb stacked catalysts comprising vanadium pentoxide as taught by Balling. Indeed, EU '480 discloses the desirability of cheap, long-lasting catalysts which also have a filtration effect. (See Ex. A, pg. 3). One skilled in the art would recognize that vanadium pentoxide does not have these characteristics. In other words, EU '480 teaches away from the catalyst and configuration taught by Balling.

As a result, the Examiner has not established that any of the references teach or suggest a motivation for their combination. Therefore, the only possible way that the references were combined was through the impermissible use of the Appellants' specification. Accordingly, there is no motivation provided by any of the cited patents to combine the teachings of Balling with those of EU '480. As such, MPEP § 2145 mandates that the Examiner has failed to establish a proper motivation to combine the references. Accordingly, the Examiner has not established a *prima facie* case of obviousness under 35 U.S.C. § 103 in accordance with element (1) of MPEP § 2143, and the rejection must be withdrawn.

In summation, the Examiner has failed to establish a *prima facie* case of obviousness in accordance with element (1) of MPEP § 2143 because the Examiner has improperly utilized the

Appellants' specification using hindsight to establish a motivation to combine the references. This is improper under MPEP § 2145. Finally, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims. Accordingly, Claims 9, 10, 12, and 13 are also submitted to be allowable. Reversal of the rejection of Claims 9, 10, 12, and 13 by the Board is respectfully requested.

#### IX. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF CARLBORG

The Examiner rejected Claim 11 under 35 U.S.C. § 103(a) as being unpatentable over EU '480 in view of Carlborg et al, United States Patent No. 6,534,022 (hereinafter "Carlborg"). The Examiner opined:

EU '480 discloses the catalyst elements 20 but fails to disclose the catalyst bed comprises a catalyst supported on a mesh-like structure having a void space of at least about 85%. Carlborg teaches the catalyst supported on a mesh-like structure with a porosity greater than 85% (Col. 2, lines 1-7), which provides the benefits of superior heat transfer, low thermal mass, and improved catalyst effectiveness (Col. 8, lines 35-39). Thus, it would have been obvious in view of Carlborg to one having ordinary skill in the art to modify the catalyst elements of EU '480 with the catalyst of a mesh-like structure as taught by Carlborg in order to gain the above benefits. (Final Office Action dated November 1, 2006, pp. 10-11).

Applicants note that Claim 11 is based on Claim 1 and all arguments for its patentability apply to this claim. Accordingly, Claim 11 is also submitted to be allowable. Reversal of the rejection of Claim 11 by the Board is respectfully requested.

#### X. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF PRIOR ART ADMISSION

The Examiner rejected Claim 16 under 35 U.S.C. § 103(a) under 35 U.S.C. § 103(a) as being unpatentable under EU '480 in view of a prior art admission. According to the Examiner:

EU '480 discloses fan blades but fails to disclose blade units have a variable pitch. Admission discloses it is conventional to use blade units with a variable pitch to control the flue gas velocity. Thus it would have been obvious in view of Admission to one having ordinary skill in the art to modify the fan blade of EU' 480 with the blades having variable pitch in order to control the flue gas velocity. (Final Office Action dated November 1, 2006, p. 11).

Applicants note that Claim 16 is based on Claim 1 and all arguments for its patentability apply to this claim. Further Claim 16 is patentable in its own right.

1. The Examiner has improperly combined the references because he has not established a motivation for their combination.

As previously stated in Section IV of this Brief, MPEP § 2145 dictates that using the Appellants' specification as a guide to cobble together references is the impermissible use of hindsight which fails to establish a proper motivation to combine the references as required by element (1) of MPEP §2143.

In this rejection, the prior art references relied upon by the Examiner fail to provide any teaching, suggestion or motivation for the combination asserted by the Examiner in rejecting the pending claims. More specifically, EU '480 does not disclose the desirability of utilizing fan blades to control the flue gas velocity. In contrast, the fan blades of EU '480 are passive. That is, the movement of the flue gas actually spins the blades. Indeed, the pitch of a turbine's blade(s) are specifically designed to provide the turbine its highest efficiency; variable fan blades would make EU '480 extremely inefficient. As a result, the references teach away from each other. Accordingly, one skilled in the art would not be motivated to combine the references utilizing the Examiner's rationale.

Thus, the Examiner has not established that any of the references teach or suggest a motivation for their combination. Therefore, the only possible way that the references were combined was through the impermissible use of the Appellants' specification. Accordingly, there is no motivation provided by any of the cited patents to combine the teachings of the

admitted prior art with those of EU '480. As such, MPEP § 2145 mandates that the Examiner has failed to establish a proper motivation to combine the references. Accordingly, the Examiner has not established a *prima facie* case of obviousness under 35 U.S.C. § 103 in accordance with element (1) of MPEP § 2143, and the rejection must be withdrawn.

In summation, the Examiner has failed to establish a *prima facie* case of obviousness in accordance with element (1) of MPEP § 2143 because the Examiner has improperly utilized the Appellants' specification using hindsight to establish a motivation to combine the references. This is improper under MPEP § 2145. Finally, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims. Accordingly, Claim 16 is also submitted to be allowable. Reversal of the rejection of Claim 16 by the Board is respectfully requested.

#### XI. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF ACASTER

The Examiner rejected Claim 17 under 35 U.S.C. as being unpatentable over EU '480 in view of Acaster, United States Pat. No. 5,709,088. The Examiner's reason for the rejection is as follows:

EU '480 shows a fan having impeller [sic] but fails to disclose the impeller has a variable speed of rotation which is adjustable while the impeller is rotating. Acaster teaches an engine turbine (Fig. 1) having an impeller with variable speed of rotation depending on the demand of the exhaust gas quantity and pressure. Thus, it would have been obvious in view of Acaster to one having ordinary skill in the art to modify the fan of EU '480 with impeller has [sic] a variable speed of rotation as taught by Acaster in order to keep up with demand of the exhaust gas and pressure. (Final Office Action dated November 1, 2006, p. 12).

Applicants note that Claim 17 is based on Claim 1 and all arguments for its patentability apply to this claim. Further Claim 17 is patentable in its own right.

1. The Examiner's reliance on non-analogous art is improper and fails to properly establish a *prima facie* case of obviousness under 35 U.S.C. § 103.

As previously stated, MPEP § 2141.01(a), [i]n order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the filed of the applicant's endeavor, or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." (Internal citations omitted). Further, the MPEP discloses that a reference is reasonably pertinent if "the matter with which it deals logically would have commended itself to an inventor's attention in considering his problem." *Id.* (Citations omitted).

Appellants submit that Acaster is an inappropriate reference because it is non-analogous art. Acaster is directed to the internal parts of an internal combustion engine. This technology has no bearing on increasing the efficacy of a catalyst bed, a chemical art. Clearly the technical fields are different. Indeed, one seeking to improve the performance of NOx removal through the use of a catalyst bed would not logically look to an internal combustion engine because it does not have a catalyst bed. As such, the reference is not reasonably pertinent and the reference is not analogous art. Since the reference is non-analogous, it is improper to rely on it in making a 35 U.S.C. § 103 rejection. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn. Reversal of this rejection by the Board is respectfully requested.

Further, as previously stated in Section IV of this Brief, MPEP § 2145 dictates that using the Appellants' specification as a guide to cobble together references is the impermissible use of hindsight which fails to establish a proper motivation to combine the references as required by element (1) of MPEP §2143. In this rejection, the prior art references relied upon by the Examiner fail to provide any teaching, suggestion or motivation for the combination asserted by the Examiner in rejecting the pending claims. More specifically, EU '480 does not disclose the

desirability of utilizing fan blades to control the flue gas velocity. In contrast, the fan blades of EU '480 are passive. That is, the movement of the flue gas actually spins the blades. The blades merely act to increase suction of outside air into the system. (See Ex. A, pp. 4-5). As a result, the spinning of the blades is actually controlled by the velocity of the exhaust gas. (Ex. A, pg. 5). Accordingly, one skilled in the art would not be motivated to combine the references utilizing the Examiner's rationale.

Thus, the Examiner has not established that any of the references teach or suggest a motivation for their combination. Therefore, the only possible way that the references were combined was through the impermissible use of the Appellants' specification. Accordingly, there is no motivation provided by any of the cited patents to combine the teachings of Acaster with those of EU '480. As such, MPEP § 2145 mandates that the Examiner has failed to establish a proper motivation to combine the references. Accordingly, the Examiner has not established a *prima facie* case of obviousness under 35 U.S.C. § 103 in accordance with element (1) of MPEP § 2143, and the rejection must be withdrawn.

In summation, the Examiner has failed to establish a *prima facie* case of obviousness because he has improperly relied upon non-analogous art. in accordance with element (1) of MPEP § 2143 because the Examiner has improperly utilized the Appellants' specification using hindsight to establish a motivation to combine the references. This is improper under MPEP § 2145. Finally, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims. Accordingly, Claim 17 is also submitted to be allowable. Reversal of the rejection of Claim 17 by the Board is respectfully requested.

## XII. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF YAMAGUCHI

The Examiner rejected Claims 21-24 under 35 U.S.C. § 103(a) as being unpatentable over EU '480 in view of Yamaguchi. With regards to this rejection, the Examiner stated:

EU '480 discloses a system for catalytically treating a gas stream which comprises: a gas phase reactor containing a catalyst (disks 20) for the treatment of the gas stream containing NO<sub>x</sub> (page 2, line 1) in at least one catalyst bed having an upstream end and a downstream end; an axial fan (7) positioned upstream of the at least one catalyst bed and having a rotatable impeller (rotor blades as shown in Figure 1) for moving the gas stream through the gas phase reactor. EU '480 discloses the claimed invention except fails to disclose means for recycling a portion of the gas stream from downstream of the axial fan to a position upstream of the axial fan and means for introducing the reducing agent into the recycle manifold. Yamaguchi discloses a gas-recycling stream (via fan 10, Figure 2) downstream of a gas turbine 1 to facilitate vaporizing the ammonia and means for introducing reducing agent (via nozzle 10a) to the convection (4) to facilitate in reducing the NO<sub>x</sub>... Thus it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to modify the gas treatment system of EU '480 with a gas recycling stream and means for introducing the reducing agent as taught by Yamaguchi in order to facilitate vaporizing the ammonia and reducing the NO<sub>x</sub>. (Final Office Action dated November 1, 2006, p. 13).

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

Appellants note that this rejection is merely a cut and paste agglomeration of the Examiner's previous rejections described in Sections I, II, and VII of this brief for the corresponding apparatus claims. Because of this, the Examiner has made the identical mistakes previously identified in Sections I and II of this brief. Specifically, the Examiner has improperly analyzed the means-plus-function element of independent Claim 21 under MPEP § 2183 and has not established that the combined references disclose each and every element of Claim 21 in accordance with element (3) of MPEP §2143. Moreover, the Examiner has run afoul of MPEP §2143.01(a) because his proposed modification of Yamaguchi would render it inoperable for its intended purpose. Further, the Examiner's reliance on *Ex parte Masham* for the assertion that



the means-plus-function element of Claim 21 (i.e., element c) should not be afforded patentable weight because it describes the manner of operating a device is contradicted not only by MPEP § 2173.05 (g), but this type of claim is authorized by statute in 35 U.S.C. § 112, ¶6.

Each of these arguments is fully presented in Sections I, II and VII of this brief. In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference each of the arguments described above in Sections I, II and VII of this Brief.

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

2. Since the Examiner has not shown that the prior art references teach each element of independent Claim 21, the Examiner cannot show that the references show each element of dependent Claims 22-24.

Claims 22-24 depend from Claim 21, which is submitted to be allowable for the reasons stated above and in Sections II and VII of this Brief. It is black letter law that dependent claims contain each and every element of the underlying independent claim.

In this instance, as previously discussed in Sections I and II of this Brief, the Examiner has not proved that each and every element of the underlying independent claim is found in any of the primary references as required by element (3) of MPEP § 2143. Therefore, the Examiner has not established a *prima facie* case for at least the elements of independent Claim 21. Since the Examiner has failed to establish a *prima facie* case of obviousness for underlying independent Claim 21, it follows that the Examiner has, at a minimum, failed to establish a *prima facie* case of obviousness for its dependent claims because dependent Claims 22-24 contain each and every element of independent Claim 21.

In summation, the Examiner has failed to establish a *prima facie* case of obviousness for numerous reasons. More specifically, the Examiner has improperly analyzed the means-plus-function element of independent Claim 21 under MPEP § 2183, has not established that the combined references disclose each and every element of Claim 21 in accordance with element (3) of MPEP §2143, has run afoul of MPEP §2143.01(a) because his proposed modification of Yamaguchi would render it inoperable for its intended purpose, and improperly analyzed the means plus function element of Claim 21 under both MPEP §§ 2183 and 2173.05(g). Further, the Examiner has improperly utilized the Appellants' specification using hindsight to establish a motivation to combine the references. This is improper under MPEP § 2145. Finally, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims. Accordingly, Claims 22-24 are also submitted to be allowable. Reversal of the rejection of Claims 22-24 by the Board is respectfully requested.

**XIII. REJECTION OF CLAIMS 25 AND 26 UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF YAMAGUCHI AS APPLIED TO CLAIM 22 AND FURTHER IN VIEW OF TYLER AND ISHIKAWA**

The Examiner rejected claims 25 and 26 under 35 U.S.C § 103 as being unpatentable over the applied references as applied to Claim 22 (i.e., EU '480 in view of Yamaguchi) and further in view of Tyler and Ishikawa.

The Examiner stated that:

The applied references disclose a transition duct (convergent section 13 to wall 34 of EU '480) which flare outward so as to gradually increase cross-sectional area available to gas stream flow but fails to disclose the transition duct having perforated walls. Tyler teaches a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of

cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Tyler in order to reduce the noise generated from the exhaust gas. (Final Office Action date November 1, 2006, p. 14).

With respect to incorporating Ishikawa, the Examiner stated:

Ishikawa teaches a flow controller 3 (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer (Col. 1, lines 31-38) and to provide uniform exhaust gas flow to the catalyst layer (Col. 1, lines 31-38). Thus it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Ishikawa<sup>6</sup> in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer. (Final Office Action dated November 1, 2006, p. 7).

Applicants note that Claims 25 and 26 are based on Claim 21 and all arguments for its patentability apply to these claims. Further Claims 25 and 26 are patentable in their own right.

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

Appellants note that this rejection is virtually identical to the Examiner's rejection described in Section V of this Brief. Indeed, the only differences between that rejection and this rejection are that the Examiner substituted the Yamaguchi reference for the Surette reference and the Examiner rejected a different claim. In other words, this rejection applies to Claims 25 and 26, which depend from Claim 21, while the rejection described in Section V of this Brief applies to Claims 5, 50, 51, and 53-55. However, because the limitations described in the claims are similar, the Examiner made the same rejections.

Since the Examiner has made the same rejections as described in Sections V and XII of this Brief, he has made similar errors. These arguments are fully presented in Section V of this

brief. In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference the argument described above in Section V of this Brief.

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

2. The combined references do not disclose each and every element of Claim 25.

In addition, the Examiner had failed to establish a *prima facie* case for obviousness because the combined references do not teach each an every element of Claim 25 as required by element (3) of MPEP § 2143.

EU '480 does not show a transition duct which has perforated walls, and does not show walls which flare outwardly to gradually increase cross-sectional area available to gas stream flow as required by Claim 25. EU '480 instead shows a convergent area 13 downstream of blades 11 that restricts the cross-sectional area available to gas flow. Moreover, burner 15 is positioned in the gas flow path downstream of the convergent section 13. EU '480 states (in translation, page 5, second paragraph):

Starting from blades 11, the internal wall of the casing of the device forms a convergent section 13 which connects the general intake section of the device to the smaller section of passage available in afterburning chamber 14 around burner 15. (Emphasis added.)

It is clear, then, that EU '480 does not disclose or suggest the invention of Claim 25. Nor does Tyler or Ishikawa cure the deficiencies of EU '480. Tyler is directed to a ground exhaust noise suppressor. (See generally, Col. 2). Indeed, Tyler discloses a perforated cylinder 36 with a conically converging rear section 38 (See, col. 4, lines 43-48). Tyler does not disclose or suggest outwardly flared perforated walls as contemplated in Claim 25. Ishikawa does not disclose or

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<sup>6</sup> Unfortunately, the Examiner has misapplied Ishikawa here. Appellants assume that Tyler is the appropriate reference. See, e.g., Note 2.

suggest anything remotely suggestive of the transition duct of the present invention as claimed in Claim 25. Therefore, the Examiner's combination of EU '480, Tyler, and Ishikawa fails to disclose each and every claim element of the present application.

Accordingly, the Examiner has not established a *prima facie* case for obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn. Reversal of the rejection of Claim 6 by the Board is respectfully requested.

Claim 25 is also submitted to be allowable. Reversal of the rejection of Claim 25 by the Board is respectfully requested.

**B. Claim 26**

At paragraph 13, the Office Action states:

Regarding Claim 26, Yamaguchi shows on Fig. 2 the gas stream recycle manifold has at least one inlet connected to the transition duct and at least one outlet connected to the convection section of the furnace.

Claim 26 depends from Claim 25 and further recites a gas stream manifold having at least one inlet connected to the transition duct and at least one outlet connected to the convection section of the furnace. Claim 26 is submitted to be separately patentable. However, because Claim 26 depends on Claim 25, all arguments made in subsection A of this section regarding Claim 25 apply equally to Claim 26.

As previously stated, MPEP 2143 mandates that in order to establish a proper rejection under 35 U.S.C. § 103, the Examiner must prove that the references relied upon teach each and every limitation of the rejected claim. In this instance, the Examiner has failed to meet this requirement.

The Examiner's characterization of the references is simply incorrect. As previously stated in Section VII of this Brief, Yamaguchi discloses that the inlet of the recycle stream is located downstream of the NO<sub>x</sub> removal system, not in anything equivalent to a transition duct as contemplated by Appellants. (See Fig. 2). In the interests of economy, the Appellants will not

re-perform the analysis. Rather, the Appellants fully incorporate by reference the argument described above in Section V of this Brief.

The exhaust gas recycle outlet of Yamaguchi is not connected to a convection section of any furnace. Rather, the exhaust gas is first sent to an ammonia vaporizer 11 and the mixture of ammonia and exhaust gas is discharged downstream of the turbine 1 and upstream of the nitrogen removal system 6. (See Fig. 2). Yamaguchi does not disclose a reactor having a convection section. Unlike Appellant's system, the gas turbine 1 of Yamaguchi does not move exhaust gas from a furnace, but rather is a means by which fuel 2 and air 3 are combusted to generate exhaust gas. Therefore, there is no disclosure or suggestion to provide a recycle manifold outlet in the convection section of a furnace.

Accordingly, none of the cited references, whether taken individually or in combination, disclose or suggest every claim element of Claim 26. As a result, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn. Reversal of the rejection by the Board is respectfully requested.

#### XIV. REJECTION UNDER 35 U.S.C. §103(a) OVER YAMAGUCHI IN VIEW OF TYLER AND ISHIKAWA

The Examiner rejected Claims 25 and 26 under 35 U.S.C. § 103(a) as being unpatentable over Yamaguchi in view of Tyler and Ishikawa. The Examiner stated:

Yamaguchi discloses a transition duct (4) which flare outward so as to gradually increase cross-sectional area available to gas stream flow but fails to disclose the transition duct having perforated walls. Tyler teaches a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Tyler in order to reduce the noise generated from the exhaust gas. (Final Office Action date November 1, 2006, p. 14).

With respect to incorporating Ishikawa, the Examiner stated:

Ishikawa teaches a flow controller 3 (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer (Col. 1, lines 31-38) and to provide uniform exhaust gas flow to the catalyst layer (Col. 1, lines 31-38). Thus it would have been obvious in view of Ishikawa<sup>7</sup> to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Ishikawa in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer. (Final Office Action dated November 1, 2006, p. 15).

Applicants note that Claim 25 is based on Claim 21 and all arguments for its patentability apply to this claim. Further Claim 25 is patentable in its own right.

A. Claim 25

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

This rejection is virtually identical to the rejections described in Sections V, XII and XIII of this Brief. The sole difference is that the Examiner substitutes Yamaguchi for EU '480.

Since the Examiner has made the same rejection as described in Sections V, XII and XIII of this Brief, he has made a similar error. That is, the Examiner has run afoul of MPEP §2141.01(a) because he has relied on non-analogous art (i.e., Tyler). As a result, the Examiner has failed to establish a motivation to combine the references in conformance with element (1) of MPEP § 2143.

These arguments are fully presented in Sections V, XII, and XIII of this brief. In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference the argument described in the above Sections of this Brief.

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<sup>7</sup> Again, Ishikawa does not disclose perforated walls. The Examiner's cut and paste methodology has led to this same mischaracterization.

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

2. The Combined References do not Disclose Each and Every Element of Claim 25

In addition, the Examiner had failed to establish a *prima facie* case for obviousness because the combined references do not teach each and every element of Claim 25 as required by element (3) of MPEP § 2143.

According to the Examiner, Yamaguchi discloses a transition duct (4) which flares out to gradually increase cross-sectional area. This statement, however, is wholly unsupported by Yamaguchi's specification. Yamaguchi does not anywhere describe or show a transition duct. Item (4) cited by the Examiner as being the "transition duct" is described by Yamaguchi as a flue. (Col. 3, lines 27, 32, 43, and 52, for example). The Yamaguchi drawings are merely system diagrams; one cannot infer from any of the depicted units in the system that a "conical transition duct" is represented. The system diagrams utilize a vaguely trapezoidal shape to indicate the general flow of the gas through the system and its components. Such an ambiguous drawing can not be considered to be an equivalent disclosure of the present application's gas flow modification means.

Tyler is cited for teaching perforated walls. The Office Action states:

Thus, it would have been obvious in view of Tyler '846 to one having ordinary skill in the art to modify the transition duct of Yamaguchi having perforated walls as taught by Tyler '846 in order to reduce noise generated from the exhaust gas.

First, as stated above, Yamaguchi does not disclose or suggest a transition duct as contemplated by Appellants. Second, Tyler does not disclose perforated flared walls. Indeed, the Examiner does not address this in his rejection. Ishikawa does not cure the deficiencies of Yamaguchi and Tyler. The Office Action cites Ishikawa for teaching a flow controller 3 in front of a catalyst layer 4. However, the flow controller 3 of Ishikawa is a grid vane which is not a



component of a perforated wall which flares outward so as to gradually increase cross-sectional area available to flue gas flow, which is a feature of Claim 25 which the Examiner fails to consider.

Accordingly, none of the cited references, whether taken individually or in combination, disclose or suggest every claim element of Claim 25. As a result, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejection must be withdrawn. Reversal of the rejection by the Board is respectfully requested.

Accordingly, Claim 25 is also submitted to be allowable.

**B. Claim 26**

1. Since the Examiner has not Shown that the Prior Art References Teach Each Element of Independent Claim 21, the Examiner Cannot Show that the References Show Each Element of Dependent Claim 25

Claim 26 depends from Claim 25, and ultimately from Claim 21, which is submitted to be allowable for the reasons stated above and in Sections II and XII of this Brief. It is black letter law that dependent claims contain each and every element of the underlying independent claim.

Applicants note that Claim 26 is based on Claim 21 and all arguments for its patentability apply to this claim. Further Claim 26 is patentable in its own right.

In summation, the Examiner has failed to establish a *prima facie* case of obviousness for numerous reasons. More specifically, the Examiner has not established that the combined references disclose each and every element of Claim 25 in accordance with element (3) of MPEP §2143. Finally, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for related dependent Claims 25 and 26.

Accordingly, Claim 25 is also submitted to be allowable. Reversal of the rejection of Claims 22-24 by the Board is respectfully requested.

XV. REJECTION UNDER 35 U.S.C. §103(a) OVER YAMAGUCHI  
IN VIEW OF SURETTE

The Examiner rejected Claim 27 under 35 U.S.C. § 103 as being unpatentable over Yamaguchi in view of Surette. In the Examiner's opinion:

Yamaguchi discloses a turbine (inherently has an axial fan) and the housing having a flared portion (conical section 4) but fails to disclose a tail cone includes [sic] a distally pointing tapered end portion. Surette teaches a gas turbine engine 101 with a tail cone (nozzle plug 117) to minimize turbulence and provide a smooth uniform flow path to the diffuser 115. Thus it would have been obvious in view of Surette to one of having ordinary skill in the art to modify the turbine structure of EU '480 with a gas turbine with a tail cone as taught by Surette in order to provide a smooth flow downstream. (Final Office Action dated November 1, 2006, p. 16).

Applicants note that Claim 27 is based on Claim 21 and all arguments for its patentability apply to this claim. Further Claim 27 is patentable in its own right.

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

Appellants note that this rejection is virtually identical to the Examiner's rejection described in Section IV of this Brief. Indeed, the only differences between that rejection and this rejection are that the Examiner substituted the Yamaguchi reference for the EU '480 reference and the Examiner rejected a different claim. In other words, this rejection applies to Claim 27 while the rejection described in Section IV of this Brief applies to Claim 4. However, because the limitations described in the claims are similar, the Examiner made the same rejections. As a result, the Examiner's rejections are similar to those found in Sections IV and XII of this Brief.

Since the Examiner has made the same rejection as described in Section IV of this Brief, he has made a similar error. That is, the Examiner fails to establish element (3) in establishing a *prima facie* case of obviousness in accordance with MPEP § 2143. In other words, the Examiner has not established that the references, when combined, contain each and every element of Claim 27.

As described above in Section XII of this Brief, Yamaguchi does not disclose “a means for recycling a portion of the flue gas downstream of the axial fan to a convection section of the furnace located upstream of the axial fan” as required by Claim 27. In the interests of economy, Appellants will not reiterate their arguments. Rather, the Appellants fully incorporate by reference the argument described above in Section IV of this Brief.

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

In summation, this rejection has relied upon art which does not contain each and every limitation of the instant claims. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103. Accordingly, Claim 27 is also submitted to be allowable. Reversal of the rejection of Claim 27 by the Board is respectfully requested.

#### XVI. REJECTION UNDER 35 U.S.C. §103(a) OVER YAMAGUCHI IN VIEW OF CARLBORG

The Examiner rejected Claim 30 under 35 U.S.C. § 103(a) as being unpatentable over Yamaguchi in view of Carlborg et al, United States Patent No. 6,534,022 (hereinafter “Carlborg”). The Examiner opined:

Yamaguchi discloses the catalyst elements 20 but fails to disclose the catalyst bed comprises a catalyst supported on a mesh-like structure having a void space of at least about 85%. Carlborg teaches the catalyst supported on a mesh-like structure with a porosity greater than 85% (Col. 2, lines 1-7), which provides the benefits of superior heat transfer, low thermal mass, and improved catalyst effectiveness (Col. 8, lines 35-39). Thus, it would have been obvious in view of Carlborg to one having ordinary skill in the art to modify the catalyst elements of EU ‘480 with the catalyst of a mesh-like structure as taught by Carlborg in order to gain the above benefits. (Final Office Action dated November 1, 2006, pp. 10-11).

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

This rejection is identical to the rejection described in Section IX of this Brief. The only difference is that the Examiner substituted Yamaguchi for EU '480. However, the Examiner admits that with respect to this rejection, the references contain the same deficiency (i.e., a catalyst bed comprising a catalyst supported on a mesh-like structure). Further, the Examiner did not alter the rationale for the combination of the references. In addition, the claim limitations which stand rejected are identical except that they depend from a different independent claim (i.e., Claim 30 depends from Claim 21, while the claim rejected in Section IX depends from Claim 1). As a result, this rejection is equivalent to the rejections enumerated in Sections IX and XII of this Brief.

Since the rejection is equivalent to the rejection described in Section IX of this Brief, the Examiner has made the same errors in his misapplication of the rules espoused in the MPEP. In short, the Examiner has failed to establish a *prima facie* case of obviousness in accordance with element (1) of MPEP § 2143 because the Examiner has improperly utilized the Appellants' specification using hindsight to establish a motivation to combine the references. Further, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims.

In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference the arguments described above in Sections IX and XII of this Brief.

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

XVII. REJECTION UNDER 35 U.S.C. §103(a) OVER YAMAGUCHI  
IN VIEW OF BALLING

The Examiner rejected Claim 28, 29, 32, and 33 under 35 U.S.C. § 103 over Yamaguchi '480 in view of Balling. In the Examiner's view:

Yamaguchi [sic] the catalyst system 6 but fails to disclose the catalyst bed includes a plurality of stackable, individually separable modules containing one or more materials selected from the group consisting of vanadium oxide, aluminum oxide, titanium oxide, tungsten oxide, molybdenum oxide and zeolite. Balling teaches a plurality of stacked honeycomb catalytic converters (8, 10, 12, 14, 16) (Col. 4, lines 65-68) made of vanadium pentoxide...to facilitate the conversion of nitrogen and carbon dioxide (Col. 6, lines 18-24). Thus, it would have been obvious in view of Balling to one having ordinary skill in the art to modify catalyst elements of EU '480 with honeycomb catalyst converters as taught by Balling to facilitate the conversion of NO<sub>x</sub> to nitrogen. (Final Office Action dated November 1, 2006, pp. 10-17).

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

This rejection is identical to the rejection described in Section VIII of this Brief. The only difference is that the Examiner substituted Yamaguchi for EU '480. However, the Examiner admits that with respect to this rejection, the references contain the same deficiency (i.e., a catalyst bed comprising a plurality of stackable modules containing a specific catalyst). Further, the Examiner did not alter the rationale for the combination of the references. In addition, the claim limitations which stand rejected are identical except that they depend from a different independent claim (i.e., Claims 28, 29, 32, and 33 depend from Claim 21, while the claim rejected in Section VIII depends from Claim 1). As a result, this rejection is equivalent to the rejections enumerated in Sections VIII and XII of this Brief.

Since the rejection is equivalent to the rejection described in Section VIII of this Brief, the Examiner has made the same errors in his misapplication of the rules espoused in the MPEP. In short, the Examiner has failed to establish a *prima facie* case of obviousness in accordance with element (1) of MPEP § 2143 because the Examiner has improperly utilized the Appellants' specification using hindsight to establish a motivation to combine the references. Further, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims.

In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference the arguments described above in Sections VIII and XII of this Brief.

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

#### XVIII. REJECTION UNDER 35 U.S.C. §103(a) OVER YAMAGUCHI IN VIEW OF ADMISSION

The Examiner rejected Claim 36 under 35 U.S.C. § 103(a) as being unpatentable under Yamaguchi in view of a prior art admission. According to the Examiner:

Yamaguchi discloses the gas turbine with fan blades but fails to disclose blade units have a variable pitch. Admission discloses it is conventional to use blade units with a variable pit to control the flue gas velocity. Thus it would have been obvious in view of Admission to one having ordinary skill in the art to modify the fan blade of EU' 480 with the blades having variable pitch in order to control the flue gas velocity. (Final Office Action dated November 1, 2006, p. 17).

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

This rejection is identical to the rejection described in Section X of this Brief. The only difference is that the Examiner substituted Yamaguchi for EU '480. However, the Examiner admits that with respect to this rejection, the references contain the same deficiency (i.e., axial fan blades with a variable pitch). Further, the Examiner did not alter the rationale for the combination of the references. In addition, the claim limitations which stand rejected are identical except that they depend from a different independent claim (i.e., Claim 36 depends from Claim 21, while the claim rejected in Section X depends from Claim 1). As a result, this rejection is equivalent to the rejections enumerated in Sections X and XII of this Brief.

Since the rejection is equivalent to the rejection described in Section X of this Brief, the Examiner has made the same errors in his misapplication of the rules espoused in the MPEP. In short, the Examiner has failed to establish a *prima facie* case of obviousness in accordance with element (1) of MPEP § 2143 because the Examiner has improperly utilized the Appellants' specification using hindsight to establish a motivation to combine the references. Further, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims.

In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference the arguments described above in Sections X and XII of this Brief.

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

XIX. REJECTION UNDER 35 U.S.C. §103(a) OVER YAMAGUCHI  
IN VIEW OF ACASTER

The Examiner rejected Claim 17 under 35 U.S.C. as being unpatentable over EU '480 in view of Acaster, United States Pat. No. 5,709,088. The Examiner's reason for the rejection is as follows:

Yamaguchi discloses a gas turbine with fan blades but fails to disclose the impeller has a variable speed of rotation which is adjustable while the impeller is rotating. Acaster teaches an engine turbine (Fig. 1) having an impeller with variable speed of rotation depending on the demand of the exhaust gas quantity and pressure. Thus, it would have been obvious in view of Acaster to one having ordinary skill in the art to modify the fan of EU '480 with impeller has [sic] a variable speed of rotation as taught by Acaster in order to keep up with demand of the exhaust gas and pressure. (Final Office Action dated November 1, 2006, p. 18).

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

This rejection is identical to the rejection described in Section XI of this Brief. The only difference is that the Examiner substituted Yamaguchi for EU '480. However, the Examiner admits that with respect to this rejection, the references contain the same deficiency (i.e., axial fan blades with a variable rotating speed). Further, the Examiner did not alter the rationale for the combination of the references. In addition, the claim limitations which stand rejected are identical except that they depend from a different independent claim (i.e., Claim 37 depends from Claim 21, while the claim rejected in Section XI depends from Claim 1). As a result, this rejection is equivalent to the rejection enumerated in Sections XI and XII of this Brief.

Since the rejection is equivalent to the rejection described in Section XI of this Brief, the Examiner has made the same errors in his misapplication of the rules espoused in the MPEP. In short, the Examiner has failed to establish a *prima facie* case of obviousness because the Examiner has not established a proper obviousness rejection for the underlying independent



claim in accordance with element (3) of MPEP § 2143. Therefore the Examiner cannot properly establish an obviousness rejection for the related dependent claims.

In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference the arguments described above in Sections X and XII of this Brief.

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

**XX. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF SURETTE AND TYLER AND ISHIKAWA AS APPLIED TO CLAIMS 1 AND 4 ABOVE AND FURTHER IN VIEW OF ZAGOROFF**

The Examiner rejected Claim 52 under 35 U.S.C. § 103 as being unpatentable over EU '480 in view of Surette, Tyler and Ishikawa, and further in view of Zagoroff et al., United States Pat. No. 5,746,378 (hereinafter "Zagoroff"). The examiner opined:

The applied references above fail to disclose struts positioned in an annular space between the tail cone and the interior surface of the housing. Zagoroff teaches it is conventional to provide shaft support struts 39 (Fig. 4) to facilitate distributing the air to the turbine blades. Thus, it would have been obvious in view of the applied references to provide struts between the tail cone and the housing to facilitate distributing air to the system. (Office Action dated November 1, 2006, pp. 18-19).

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

Initially, Applicants note that this rejection is unclear. The Examiner contends that his rejection is a combination of Surette, Tyler, Ishikawa, and EU '480 as applied to Claims 1 and 4 further in view of Zagoroff. However, the Examiner asserts this combination of references in his rejection of Claims 5, 50, 51, and 53-55. If his rejection was based solely on rejections to Claims 1 and 4, the Examiner would not address numerous claim limitations of Claim 52. For example, Claim 52 requires louvers. The Examiner never addresses this element in his rejection of Claims

1 and 4. However, the Examiner attempts to address this claim limitation in his rejections enumerated in Section V of this Brief. Appellants assume that the Examiner mistakenly refers to his previous rejection of Claims 1 and 4 instead of properly building upon his rejection described in Section V of this Brief. Consequently, Appellants will assume that the Examiner meant to reference the proper rejection.<sup>8</sup>

Since the Examiner has made the same rejection as described in Section V of this Brief, he has made a similar error. That is, the Examiner has run afoul of MPEP §2141.01(a) because he has relied on nonanalogous art (i.e., Tyler). As a result, the Examiner has failed to establish a motivation to combine the references in conformance with element (1) of MPEP § 2143.

These arguments are fully presented in Section V of this brief. In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference the argument described above in Section V of this Brief.

As a result, the Examiner's rejection is improper and must be withdrawn.

**XXI. REJECTION UNDER 35 U.S.C. §103(a) OVER EU '480 IN VIEW OF SURETTE AS APPLIED TO CLAIM 27 AND IN FURTHER VIEW OF TYLER AND ISHIKAWA**

The applied references disclose a transition duct (convergent section 13 to wall 34 of EU '480 and bell shaped wall 119 of Surette) which flare outward so as to gradually increase cross-sectional area available to gas stream flow and the circumference of the housing gradually increases from a position of the housing at the axial fan to the outlet of the housing but fail to disclose the transition duct having perforated walls. Tyler teaches a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Tyler in order to reduce the noise generated from the exhaust gas. (Final Office Action date November 1, 2006, p. 19).

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<sup>8</sup> This makes intuitive sense as well since Claim 52 depends from Claim 50, a Claim that was only rejected in Section V of the Examiner's rejection.

In applying Ishikawa, the Examiner reiterated:

Ishikawa teaches a flow controller 3 or (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer. (Col. 1, lines 31-38) and to provide a uniform gas flow. Thus, it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of EU '480 having perforated walls as taught by Ishikawa<sup>9</sup> in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer. (Final Office Action dated November 1, 2006, p. 19).

Applicants note that Claim 57 is based on Claim 21 and all arguments for its patentability apply to this claim. Further Claim 57 is patentable in its own right.

1. The Examiner's rejection is merely a reiteration of previously flawed rejections which have already been traversed.

Appellants note that this rejection is merely an agglomeration of the Examiner's previous rejections described in Sections V and XII of this brief.

As such, the Examiner has made the identical mistakes identified in those Sections of this Brief. Namely, the Examiner has improperly analyzed the means-plus-function element of independent Claim 21 under MPEP § 2183 and has not established that the combined references disclose each and every element of Claim 21 in accordance with element (3) of MPEP §2143. Further, the Examiner's reliance on *Ex parte Masham* for the assertion that the means-plus-function element of Claim 21 (i.e., element c) should not be afforded patentable weight because it describes the manner of operating a device is contradicted not only by MPEP § 2173.05 (g), but this type of claim is authorized by statute in 35 U.S.C. § 112, ¶6. In addition, the Examiner improperly relies on Tyler, which is non-analogous art. Finally, the Examiner never even addresses the claim limitation of a guide unit comprise of louvers.

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<sup>9</sup> Again, the Appellants assume that the Examiner is referring to Tyler for teaching perforated walls.

Each of these arguments is fully presented in Sections V and XII of this brief. In the interests of economy, the Appellants will not re-perform the analysis. Rather, the Appellants fully incorporate by reference each of the arguments described above in Sections V and XII of this Brief

Accordingly, for the reasons previously enumerated, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be withdrawn. Reversal by the Board is respectfully requested.

In summation, the Examiner has failed to establish a *prima facie* case of obviousness for numerous reasons. More specifically, the Examiner has improperly analyzed the means-plus-function element of independent Claim 21 under MPEP § 2183 and has not established that the combined references disclose each and every element of Claim 21 in accordance with element (3) of MPEP § 2143. Further, the Examiner has improperly utilized the Appellants' specification using hindsight to establish a motivation to combine the references. This is improper under MPEP § 2145. Finally, because the Examiner has not established a proper obviousness rejection for the underlying independent claim in accordance with element (3) of MPEP § 2143, the Examiner cannot properly establish an obviousness rejection for the related dependent claims. Accordingly, Claim 57 is also submitted to be allowable. Reversal of the rejection of Claim 57 by the Board is respectfully requested.

Overall, Appellants have been forced to file this second appeal brief in response to the Examiner's consistent misapplication of both the prior art and the proper examining guidelines mandated by the MPEP. The Examiner's conclusory rejections, subjective suppositions, and duplicative rejections (right down to the typographical errors) have the Appellants at their wits end. As shown in this Brief, each and every rejection made by the Examiner is flawed in one or more ways. As a result, his rejections are improper. Since the Examiner has steadfastly

maintained his rejections, the Appellants have no other recourse but to plea for reversal from the Board.

## **VIII. CLAIMS APPENDIX**

The claims on appeal are as follows:

1. A system for catalytically treating a gas stream, which comprises:
  - a) a gas phase reactor containing a catalyst for the treatment of the gas stream in at least one catalyst bed having an upstream end and a downstream end;
  - b) an axial fan positioned upstream of the at least one catalyst bed and having a rotatable impeller for moving the gas stream through the gas phase reactor; and,
  - c) gas flow modification means positioned between the impeller and the gas phase reactor for decreasing gas stream velocity and increasing gas flow uniformity.
2. The system of claim 1 wherein the gas flow uniformity is increased by the gas flow modification means such that the gas stream entering the gas phase reactor has a velocity profile exhibiting not more than about 10% velocity deviation from an average gas stream velocity at the upstream end of the at least one catalyst bed.
3. The system of claim 2 wherein the velocity profile of the gas stream exhibits no more than about a 5% velocity deviation from an average gas stream velocity at the upstream end of the at least one catalyst bed.
4. The system of claim 1 wherein the axial fan includes a housing and a tail cone, and the gas flow modification means includes a distally pointing tapered end portion of the tail cone and a flared portion of the housing having a gradually increasing diameter.
5. The system of claim 4 wherein the gas flow modification means further includes a transition duct having perforated walls which flare outward so as to gradually increase cross-sectional area available to gas stream flow.
6. The system of claim 1 wherein the gas flow modification means includes a transition duct having perforated walls which flare outward so as to gradually increase cross-sectional area available to gas stream flow.

7. The system of claim 1 further including means for recycling a portion of the gas stream from downstream of the axial fan to a position upstream of the axial fan.
8. The system of claim 1 wherein the gas stream contains nitrogen oxide.
9. The system of claim 1 wherein the catalyst bed includes a plurality of stackable, individually separable modules containing one or more materials selected from the group consisting of vanadium oxide, aluminum oxide, titanium oxide, tungsten oxide, molybdenum oxide and zeolite.
10. The system of claim 9 wherein the modules each comprise a plurality of stacked catalyst elements having a honeycomb type structure.
11. The system of claim 1 wherein the catalyst bed comprises a catalyst supported on a mesh-like structure having a void space of at least about 85%.
12. The system of claim 1 wherein the catalyst bed includes a vanadium pentoxide catalyst on titanium oxide support.
13. The system of claim 1 wherein the gas phase reactor comprises at least two catalyst beds arranged in series.
14. The system of claim 1 wherein the fan impeller includes a plurality of blade units attached to and extending radially outward from a circumferential periphery of the impeller.
15. The system of claim 14 wherein the blade units each comprise two blades.
16. The system of claim 14 wherein the blade units have a variable pitch which is controllable while the impeller is rotating.
17. The system of claim 14 wherein the impeller has a variable speed of rotation which is adjustable while the impeller is rotating.

18. The system of claim 1 further including a heat recovery section positioned downstream of the gas phase reactor for cooling the gas stream.

19. The system of claim 1 further including means for introducing reducing agent into the gas stream.

20. The system of claim 19 further including a gas stream recycle manifold for communicating a portion of the gas stream downstream of the axial fan to a convection section of a furnace positioned upstream of the axial fan, wherein the means for introducing reducing agent comprises an inlet for introducing the reducing agent into the gas stream recycle manifold.

21. A system for catalytically treating a furnace flue gas, which comprises:

a) a gas phase reactor containing a catalyst for the treatment of the flue gas in at least one catalyst bed having an upstream end and a downstream end;

b) an axial fan positioned upstream of the at least one catalyst bed and downstream of a furnace and having a rotatable impeller for moving the flue gas from the furnace through the gas phase reactor; and,

c) means for recycling a portion of the flue gas from downstream of the axial fan to a convection section of the furnace located upstream of the axial fan.

22. The system of claim 21 wherein the means for recycling a portion of the flue gas comprises a gas stream recycle manifold.

23. The system of claim 22 wherein the gas stream recycle manifold includes an inlet for introducing reducing agent into recycle manifold.

24. The system of claim 22 wherein the gas stream recycle manifold includes a control valve.

25. The system of claim 22 further comprising a transition duct having perforated walls which flare outward so as to gradually increase cross-sectional area available to flue gas flow.



26. The system of claim 25 wherein the gas stream recycle manifold has at least one inlet connected to the transition duct, and at least one outlet connected to the convection section of the furnace.

27. The system of claim 21 wherein the axial fan includes a housing and a tail cone, the housing having a flared distal portion and the tail cone having a distally pointing tapered end portion.

28. The system of claim 21 wherein the catalyst bed includes a plurality of stackable, individually separable modules containing one or more materials selected from the group consisting of vanadium oxide, aluminum oxide, titanium oxide, tungsten oxide, molybdenum oxide and zeolite.

29. The system of claim 28 wherein the modules each comprise a plurality of stacked catalyst elements having a honeycomb type structure.

30. The system of claim 21 wherein the catalyst bed comprises a catalyst supported on a mesh-like structure having a void space of at least about 85%.

31. The system of claim 21 wherein the flue gas contains nitrogen oxide.

32. The system of claim 31 wherein the at least one catalyst bed includes a vanadium pentoxide catalyst on titanium oxide support.

33. The system of claim 21 wherein the gas phase reactor comprises at least two catalyst beds arranged in series.

34. The system of claim 21 wherein the fan impeller includes a plurality of blade units attached to and extending radially outward from a circumferential periphery of the impeller.

35. The system of claim 34 wherein the blade units each comprise two blades.

36. The system of claim 34 wherein the blade units have a variable pitch which is controllable while the impeller is rotating.

37. The system of claim 34 wherein the impeller has a variable speed of rotation which is adjustable while the impeller is rotating.

38. The system of claim 21 further including a heat recovery section positioned downstream of the gas phase reactor for cooling the flue gas.

50. The system of claim 1, wherein the gas flow modification means comprises:  
a housing including a tail cone, wherein the housing surrounds the axial fan, and wherein the tail cone is positioned downstream from the axial fan; and,  
a transitional duct having perforated walls that are flared outward disposed downstream from the housing.

51. The system of claim 50, wherein the tail cone has a substantially conical shape and comprises a distally pointing tapered end portion.

52. The system of claim 51, wherein the tail cone is supported within the housing by longitudinally oriented planar struts positioned in an annular space between the tail cone and an interior surface of the housing, wherein the struts act as baffles to reduce swirl and direct gas flow towards an axial flow of the flue gas through the system.

53. The system of claim 50, wherein the housing further comprises:

an outlet, wherein a diameter of the outlet is greater than a diameter of an impeller of the axial fan, and wherein the circumference of the housing gradually increases from a position of the housing at the axial fan to the outlet of the housing.

54. The system of claim 50, wherein the gas flow modification means further comprises a guide vane unit disposed at an inlet of the transition duct, wherein the guide vane unit includes louvers for redirecting the flow of the flue gas.

55. The system of claim 4, wherein the gas flow modification means further comprises:

a transition duct having perforated walls that flare outward positioned downstream from the housing; and,

a guide vane unit disposed at an inlet of the transition duct, wherein the guide vane unit includes louvers for redirecting the flow of the flue gas.

56. The system of claim 6, wherein the gas flow modification means further comprises:

a transition duct having perforated walls that flare outward positioned downstream from the housing; and,

a guide vane unit disposed at an inlet of the transition duct, wherein the guide vane unit includes louvers for redirecting the flow of the flue gas.

57. The system of claim 27, wherein the gas flow modification means further comprises:

a transition duct having perforated walls that flare outward positioned downstream from the housing; and,

a guide vane unit disposed at an inlet of the transition duct, wherein the guide vane unit includes louvers for redirecting the flow of the flue gas.

## **IX. EVIDENCE APPENDIX**

No additional evidence has been provided.

## **X. RELATED PROCEEDINGS APPENDIX**

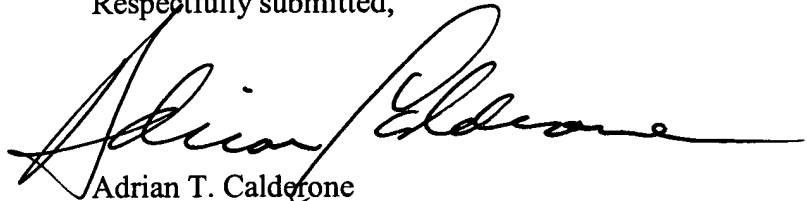
There are no related proceedings.

**CONCLUSION**

For at least the reasons stated above, all of the claims are submitted to be patentable.

Reversal of all of the rejections by the Board is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Adrian T. Calderone", written in a cursive style.

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